

# Casualty Actuarial Society E-Forum, Summer 2009



Including the Report of the 2008 CAS Quinquennial  
Membership Survey Task Force

# The Summer 2009 CAS *E-Forum*

The Summer 2009 Edition of the CAS *E-Forum* is a cooperative effort between the Committee for the CAS *E-Forum* and various other CAS committees. This *E-Forum* includes three papers and a report of the 2008 CAS Quinquennial Membership Survey.

The CAS Quinquennial Membership Survey Task Force was responsible for overseeing this survey of the CAS membership in 2008. The task force developed the survey with appropriate input, supervised its administration and tabulation, and prepared the report of the results for the CAS leadership in February 2009.

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# 2009 Summer *E-Forum*

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# Flexible Factor Chain Ladder Model: A Stochastic Framework for Reasonable Link Ratio Selections

Emanuel Bardis, FCAS, MAAA; Ali Majidi; and Daniel Murphy, FCAS, MAAA

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**Abstract:** The popular General/Property-Casualty Insurance chain ladder method was first expanded to include variance calculations by Mack [1]. As new research expands the chain ladder method's stochastic functionality, it is as important as ever to understand the assumptions underlying this fundamental approach and evaluate their appropriateness given the data. The purpose of this paper is to introduce more statistical rigor to this popular method and help bridge the gap between practice and statistical theory. We will expand the regression approach of Murphy[2] so that selected link ratios other than simple or volume weighted averages can be seen as optimizing a rigorous statistical model. We will derive formulas for the parameter risk and process risk of ultimate losses projected from such selected link ratios. We will discuss residual analysis and statistical measures for validating the selected factors. Using data previously analyzed in the literature, we will compare stochastic results from the popular application of the Mack formula to those based on our model. It is hoped that this paper will provide the actuarial practitioner with a statistically rigorous framework with which to measure objectively the appropriateness of the chain ladder deterministic and stochastic results, make more informed judgmental selections, and avoid injudicious conclusions based on potentially inappropriate assumptions.

**Keywords:** chain ladder; selection; Mack; Murphy; variance; reserve risk; residuals

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## Introduction

The Chain Ladder method is the most popular algorithm by which actuarial practitioners calculate a central estimate of the unpaid claim liability. Given the need of the actuarial profession to provide statistical descriptions, or models, of the loss development process, much research in the last two decades has been dedicated to framing this method within a statistical structure. This is the reason for the appeal of the stochastic formulas of Dr. Thomas Mack [1], who was the first to produce such a statistical model for the case of volume weighted average age-to-age factors (link ratios). Murphy [2] considers the chain ladder method as a special case of a more general linear regression approach. Zehnwirth [3] refers to this broader class of chain ladder models as the “extended link ratio family,” but rejects that family on the grounds of insufficient predictive power and favors the “probability trend family” (PTF) instead. Using a Bayesian approach, Verall [4] incorporates judgment in a rigorous fashion to tackle the inflexibility of other methods (such as Zehnwirth’s PTF). Unfortunately, the difficulty of verifying *a priori* link ratio distributions and the overall complexity of the MCMC (Markov Chain Monte Carlo) algorithm make this method difficult to implement in large enterprises.

The purpose of this paper is to bridge the gap between the stochastic underpinnings of the chain ladder method and its implementation in practice, i.e., when link ratios are selected based on judgment. We present a general chain ladder model that fulfills two key requirements:

1. Its central estimates are consistent<sup>1</sup> with chain ladder projections based on judgmentally selected factors<sup>2</sup>, and
2. Its underlying assumptions and actuarial inputs are testable within a rigorously-defined statistical framework.<sup>3</sup>

The paper is organized as follows. In Section 1 we propose a flexible yet rigorous model of the chain ladder method built around the regression interpretation similar to Murphy [2] that satisfies the two requirements above. We call this model the Flexible Factor Model (FFM). In Section 2 we present formulas for the mean square error of chain ladder projections based on selected link ratios, as long as those selections are “reasonable” (defined below). In Section 3 we demonstrate how our model naturally embeds a process for visually and statistically testing the consistency of the actuary’s selected link ratios with the development data within the triangle. Section 4 demonstrates these concepts with an example. In Section 5 we compare the FFM process, parameter and total risk estimates to the Mack [1] versions, showing that the Mack model is a special case of FFM when the actuary selects volume weighted link ratios. We also show how common use of “the Mack Method” can significantly understate potential variability. Section 6 is a summary that also includes thoughts for future research. We conclude with an Appendix of proofs of our major results.

## 1. A Chain Ladder Model for Flexibly-Selected Link Ratios

We start with the usual notation, where the observed cumulative paid losses<sup>4</sup> are denoted by the set  $\mathbf{D} = \{C_{ij} \mid 1 \leq i \leq I, 1 \leq j \leq I + 1 - i\}$ . A regression model equivalent to the chain ladder method is

$$C_{ik+1} = f_k C_{ik} + \sigma_k \varepsilon_{i,k} C_{i,k}^{\alpha_k/2} \quad (1)$$

$$\varepsilon_{i,k} \sim \mathcal{N}(0,1), 1 \leq i \leq I, 1 \leq k \leq I + 1 - i. \quad (2)$$

This model is similar to the model proposed by Mack [1] and Murphy [2], with a more general and, as we shall see, more flexible error assumption (1). Assumption (2) is that the set  $\{\varepsilon_{ik} \mid 1 \leq i \leq I, 1 \leq k \leq I + 1 - i\}$  of “noise given the Triangle  $\mathbf{D}$ ” is comprised of independent

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<sup>1</sup> By “consistent” we mean that the model’s estimates will be the same as the estimates produced by the chain ladder’s algorithmic steps.

<sup>2</sup> For example, when considering benchmarks in a reserve analysis.

<sup>3</sup> For example, to test, validate, and approve a company’s internal model within the framework of Solvency II; see *Proposal for a Directive of the European Parliament and of the Council on the taking-up and pursuit of the business of Insurance and Reinsurance - Solvency II* {SEC(2007) 870} {SEC(2007) 871, Article 43: Risk Management <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52007PC0361:EN:NOT>

<sup>4</sup> We refer to loss amounts as paid losses for consistency with prior literature. In fact, losses can be either paid or incurred amounts; can include or exclude adjustment expense; can even refer to claim counts. In short, the theory applies to any chain ladder estimable amount.

identical distributed (i.i.d.) normal<sup>5</sup> random variables; in particular we assume  $E(\varepsilon_{ik}) = 0$  and  $E(\varepsilon_{i,k}^2) = 1$ . Making explicit the implicit assumption of the error term is crucial for providing a data set of residuals for model testing.

Under assumptions (1), (2) the best linear unbiased estimate of the link ratio, given the set of observations  $\mathbf{D}$ , can be calculated as weighted averages of the observed link ratios:

$$\hat{f}_k(\alpha) = LR_k(\alpha) = \sum_{i=1}^{n-k} \frac{C_{i,k}^{1-\alpha}}{\sum_{j=1}^{n-k} C_{j,k}^{2-\alpha}} \cdot C_{i,k+1} = \sum_{i=1}^{n-k} w_{i,k}^\alpha \cdot F_{i,k} \quad (3)$$

where

$$F_{i,k} = \frac{C_{i,k+1}}{C_{i,k}}$$

is the accident year  $i$  link ratio from age  $k$  to age  $k+1$ , and the weights are functions of  $\alpha$ :

$$w_{i,k}^\alpha := \frac{C_{i,k}^{2-\alpha}}{\sum_{j=1}^{n-k} C_{j,k}^{2-\alpha}}. \quad (4)$$

The optimal solution of model (1), (2) is specified by the parameters  $(\hat{f}, \hat{\alpha})$  (the “model specification”) where the solution for the values of the  $\hat{\alpha}$ 's will be discussed below. (Notational remark: The superscript  $\alpha$  of  $w$  is not an exponent but emphasizes that the weights are a function of  $\alpha$ .)

To illustrate, consider the “Distribution Free” chain ladder model introduced in Mack [8]. Mack's model is a special case of model (1), (2) with  $\alpha_k=1$ ,  $k=1, \dots, I$ . Mack proved that the weighted average link ratio estimators

$$\hat{f}_k = LR_k(1) = \sum_{i=1}^{n-k} \frac{C_{i,k}}{\sum_{j=1}^{n-k} C_{j,k}} \cdot \frac{C_{i,k+1}}{C_{i,k}} = \frac{\sum_{i=1}^{n-k} C_{i,k+1}}{\sum_{j=1}^{n-k} C_{j,k}}$$

are unbiased with the smallest variance<sup>6</sup>. Clearly these estimators are consistent with formula (3) with  $\alpha=1$  for all  $k$ .

<sup>5</sup> The normality assumption is made to assure that the Chain Ladder link ratios correspond to ML-estimators. Other distributions can be assumed as well, but that might lead to an ML solution other than the least squares solution.

<sup>6</sup> Submission to the 1994 *Variability in Reserves Prize Program*: “Measuring the Variability of Chain Ladder Reserve Estimates,” CAS Forum, 1994, Vol. 1, p. 141.

To reiterate, by selecting an  $\alpha$  parameter we specify the *variance assumption* of model (1), (2). We shall see that for any “reasonably selected link ratio” (defined below) we can select an appropriate  $\alpha$  parameter that will yield the selected link ratio as the best linear unbiased chain ladder estimator. That is what we mean when we say that by virtue of this simple error term extension, *model* (1), (2) embeds the traditional selected-factor-based chain ladder *method* in a statistical framework. We refer to model (1), (2) as the Flexible Factor Model (FFM).

We digress momentarily to distinguish between a model and a method. A model is a mathematical description of an observation, process or phenomenon, where “best fitted” parameters are based on the underlying data characteristics. A method on the other hand is an algorithm that produces estimates through a sequence of predetermined steps. Thus a method can always be used to calculate some estimates, whereas a model is based on assumptions that should be tested before its results are trusted. The traditional Chain Ladder *method* is consistent with many stochastic models that have been built around it, such as the Mack, Murphy, and over-dispersed Poisson models. In practice, however, actuaries *select* link ratios judgmentally because simple or volume weighted averages may be inappropriate in certain situations.<sup>7</sup> There is no doubt that such flexibility makes practical sense, but no matter how experienced an actuary is, the appropriateness of his/her judgment is always open to question. Under the *model* framework of this paper an actuary can respond to such challenges with objective, statistical justification.<sup>8</sup> We revisit this point in Section 3.

We present now our first major results.

### **Theorem 1.1: The “Reasonable” Link Ratio Function**

Consider for a given triangle the corresponding link ratio function as in (3) and denote the set of all *reasonable* link ratios with  $LR_k(\mathfrak{R}) := \{LR_k(\alpha) \mid \alpha \in \mathfrak{R}\}$  where  $i_{\min,k}$  and  $i_{\max,k}$  are the indices of  $\min\{C_{j,k}, j < I - k\}$  and  $\max\{C_{j,k}, j < I - k\}$  respectively. Then

1. If  $c, d \in LR_k(\mathfrak{R})$ , then the whole interval  $[c, d] \subseteq LR_k(\mathfrak{R})$
2.  $LR_k(\alpha) \rightarrow F_{i_{\min,k}}$  as  $\alpha \rightarrow \infty$
3.  $LR_k(\alpha) \rightarrow F_{i_{\max,k}}$  as  $\alpha \rightarrow -\infty$
4. Every link ratio between the straight average, the weighted average and the link ratios corresponding to the minimum  $\min\{C_{j,k}, j < I - k\}$  and maximum

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<sup>7</sup> An experienced actuary recognizes, for example, trends in the triangles and adjusts the link ratios manually, perhaps influenced by a benchmark pattern.

<sup>8</sup> Furthermore we mention here that the residuals are often used to simulate the distribution of the stochastic reserving process through the Bootstrapping approach. The core of the Bootstrapping method is the “independent identically distributed” assumption (2). The Bootstrapping results will be wrong if this assumption is violated.



$\max\{C_{j,k}, j < I - k\}$  of the loss amounts as of the previous maturity (i.e., the denominators of these link ratios) is reasonable.

### **Theorem 1.2: Existence of Optimal Alphas**

Let  $h_k \in \text{LR}_k(\mathfrak{R}), k \leq I - 2$  be a set of reasonable link ratios (as defined in Theorem 1.1). Then for each  $k$  there is at least one  $\alpha$  such that  $h_k$  is the ML-estimator of (1). We define the “optimal alpha” as

$$\hat{\alpha}_k := \max(\min\{\alpha > 0 \mid h_k = \text{LR}(\alpha)\}, \max\{\alpha \leq 0 \mid h_k = \text{LR}(\alpha)\}).$$

The condition  $k \leq I - 2$  is stipulated because for the last development period ( $k = I - 1$ ) a regression approach will not work if there is only one observation. Proofs of Theorems 1.1 and 1.2 are in the appendix.

In other words, among all possible  $\alpha$ , we take the one with smallest absolute value. If two possible  $\alpha$  have exactly the same absolute value (i.e., more than one standard deviation FFM variance assumption is associated with the same link ratio), we choose the positive one. Thus,  $\hat{\alpha}_k$  is well defined. Furthermore, values can be calculated using a solver<sup>9</sup>.

Note that in the usual chain ladder model the standard deviation of the paid development process is assumed to be proportional to the square root of cumulative payments as of the beginning of the period. But why should this hold for all development years? Theorem 1.2 relaxes the volume-weighted requirement and shows that even with reasonable, judgmentally selected link ratios there exists an underlying statistical model with those selections being the optimal solutions.

## **2. Standard Error Formulas for the Flexible Factor Model**

The Flexible Factor Model’s link ratio parameters  $f_k$  can be estimated using weighted least squares regression. Let  $\hat{f}_k$  denote those estimators, themselves random variables. Estimates of the conditional variance of those estimators,  $\Delta^2(\hat{f}_k^2) := E(\hat{f}_k^2 \mid D) - \hat{f}_k^2$ , and estimates  $\hat{\sigma}_k$  of the scale parameters are standard outputs of regression software.<sup>10</sup>

### **Formulas for an Individual Accident Year**

Consider an individual accident year (or “origin year”)  $i$  as of its current age (or “lag”)  $k$ . An estimate  $\hat{C}_{i,k+1}$  of the mean value  $\mu_{i,k+1}$  of the future loss  $C_{i,k+1}$ , given  $D$ , can be found by completing the square in the chain ladder sense. Assuming the estimates are unbiased, the mean square error of

<sup>9</sup> For example the Newton-Algorithm with starting point 0.

<sup>10</sup> The delta operator  $\Delta$  denotes parameter risk. Excel’s LINEST function refers to the statistics as “se1...the standard error of the coefficient” and “sey...the standard error for the y estimate,” respectively.

the estimate, which by definition is the expected squared difference between the estimate and its target, is the sum of parameter risk and process risk:

$$\begin{aligned} mse(\hat{C}_{i,I}) &= E((\hat{C}_{i,I} - C_{i,I})^2 | D) = (\hat{C}_{i,I} - E(C_{i,I} | D))^2 + E((C_{i,I} - E(C_{i,I} | D))^2 | D) \\ &= \Delta^2(C_{i,I}) + \Gamma^2(C_{i,I}) \end{aligned}$$

with  $\Delta^2$  and  $\Gamma^2$  denoting the operators for parameter risk and process risk, respectively. Parameter risk and process risk can be calculated recursively according to the formulas below.

*Parameter Risk: Variance of the estimate of the mean future value of loss*

For the first period after the current diagonal,

$$\Delta^2(\hat{C}_{i,k+1}) = C_{i,k}^2 \Delta^2(\hat{f}_k)$$

since  $C_{i,k}^2$  is a constant.

For  $s=2, 3, \dots$ ,

$$\Delta^2(\hat{C}_{i,k+s}) = \mu_{i,k+s-1}^2 \Delta^2(\hat{f}_{k+s-1}) + f_{k+s-1}^2 \Delta^2(\hat{C}_{i,k+s-1}) + \Delta^2(\hat{f}_{k+s-1}) \Delta^2(\hat{C}_{i,k+s-1}).$$

Note: The formulas above agree with “the Mack Formula” for  $\alpha = 0, 1, 2$  [7] with the exception of the third term (the product of the variances) in the parameter risk formula.

*Process Risk: Variance of the deviation of future value of loss from its mean*

For the first period after the current diagonal,  $\Gamma^2(C_{i,k+1}) = C_{i,k}^{\alpha_k} \sigma_k^2$ . For subsequent periods

$$\Gamma^2(C_{i,k+s}) = (E(C_{i,k+s-1})|D)^{\alpha_{k+s-1}} \cdot \Psi(\alpha, cv(C_{i,k+s-1})) \cdot \sigma_{k+s-1}^2 + f_{k+s-1}^2 \cdot \Gamma^2(C_{i,k+s-1})$$

where  $\Psi$  is a function of  $\alpha$  and of the coefficient of variation  $\kappa$  of the future losses. Estimates of the expected values  $E(C_{i,k+s-1})$  come from the chain ladder’s “squaring-the-triangle” process. The  $f_{k+s-1}$  are the selected link ratios, and  $\Gamma^2(C_{i,k+s-1})$  is the process risk as of the previous age.

Under the assumption that the “noise”  $\varepsilon_{i,k}$  is normally distributed, it is straightforward to show that the function  $\Psi$  is a polynomial in  $\kappa$  for positive integer (n) values of  $\alpha$ :<sup>11</sup>

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<sup>11</sup> Expand the Taylor series of  $f(x)=x^n$  around  $\mu$ , and use the fact that odd central moments of a normal random variable are zero and even central moments are related to  $\sigma$  according to the formula  $E(X^n) = \frac{n!}{2^{n/2} (\frac{n}{2})!} (\sigma)^n$ . See [http://en.wikipedia.org/wiki/Normal\\_distribution#Moments](http://en.wikipedia.org/wiki/Normal_distribution#Moments).

An exact value for  $\Psi(\alpha, \kappa)$  for non-integral positive values of  $\alpha$  is difficult to present in closed form because  $E(X^\alpha)$  is undefined when the probability that  $X < 0$  is non-zero (for example,  $E(\sqrt{X})$  is undefined for  $X < 0$ ). For triangles of property/casualty losses with small coefficient of variation, reasonable approximations for such real “moments” are available using simulation. Details available upon request of the authors.

$$\Psi(n, \kappa) = \sum_{\substack{j=0 \\ j \text{ even}}}^n \frac{1 \cdot n \cdot (n-1) \cdots (n-(j-1))}{2^{j/2} (j/2)!} \kappa^j .$$

For  $\alpha > 0$  but not an integer, we recommend linearly interpolating  $\Psi(\alpha, \kappa)$  between  $\Psi(\lfloor \alpha \rfloor, \kappa)$  and  $\Psi(\lceil \alpha \rceil, \kappa)$  where  $\lfloor \alpha \rfloor$  denotes the floor function of  $\alpha$ , which is the largest integer  $\leq \alpha$ , while  $\lceil \alpha \rceil$  denotes the ceiling function of  $\alpha$ , which is the smallest integer  $\geq \alpha$ .<sup>12</sup> For negative values of  $\alpha$ , note that such a selection would imply an actuarial assumption that the variability of loss at the end of a development period is *inversely* proportional to the value of loss at the beginning of the period, an unusual assumption for General/Property-Casualty insurance. Nevertheless, if the data and the selection indicate a negative  $\alpha$ , we recommend using simulation to calculate  $\Psi(\alpha, \kappa)$ . Such simulations could be performed with Excel or another programming language. An example using R is provided as Appendix B. For illustration, Figure 5 in Appendix A graphs simulated values of  $\Psi$  as a function of  $\alpha$  for different coefficients of variation. Notice that  $\Psi$  is a convex function, so linear interpolations for positive  $\alpha$  will be conservative approximations.

To calculate the parameter and process risk quantities, we need to estimate  $\Delta^2$  and  $\Gamma^2$ . We follow the traditional statistics approach here, replacing all unknown quantities by their corresponding estimates.<sup>13</sup>

### Formulas for All Accident Years Combined

Recursive variance formulas for all accident years combined become slightly more complicated because at each new age an additional accident year is included.

For ages  $j = 2, 3, \dots$ , let  $X_j = \sum_{i=L-j+2}^L C_{i,j}$  be the sum of the future values of losses for accident years that have not yet matured to age  $j$  (the most recent accident year is denoted by  $L$ ). Let  $M_j = \sum_{i=L-j+2}^L \mu_i$  denote the expected value of  $X_j$  and let  $\hat{X}_j = \sum_{i=L-j+2}^L \hat{C}_{i,j}$  be its chain ladder estimate.

#### Parameter Risk: Variance of the estimate $\hat{X}_j$

For  $j=2$ , only the most recent accident year is included in the total, so the parameter risk of  $\hat{X}_2$  is equal to  $\Delta^2(\hat{X}_2) = \Delta^2(\hat{f}_1) \cdot C_{L,1}^2$ .

For  $j=3, 4, \dots$ ,

$$\Delta^2(\hat{X}_j) = (M_{j-1} + C_{L-j+2, j-1})^2 \Delta^2(\hat{f}_{j-1}) + f_{j-1}^2 \Delta^2(\hat{X}_{j-1}) + \Delta^2(\hat{f}_{j-1}) \Delta^2(\hat{X}_{j-1}).$$

<sup>12</sup> Our tests have shown that for small  $\kappa$  the FLOOR and CEILING functions yields not significantly different results.

<sup>13</sup> See [6] for a discussion of resampling.

**Process Risk: Variance of  $X_j$**

Under Assumption (2), all accident years are independent; therefore, the process variance of the sum of the future values as of a given age is the sum of the process variances:

$$\Gamma^2(X_j) = \sum_{i=l-j+2}^l \Gamma^2(C_{i,j}).$$

As before, the formulas above agree with the “Mack Formula” for  $\alpha = 0, 1, 2$  with the exception of the third term (the product of the variances) in the parameter risk formula.

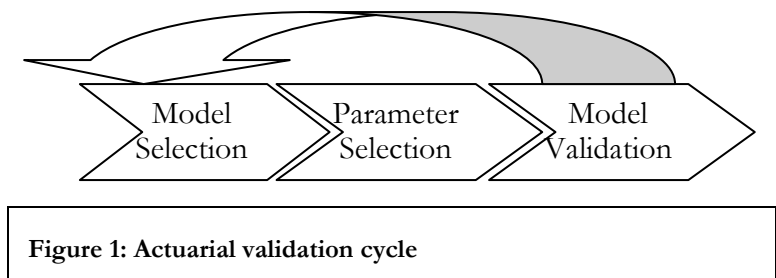
**3. Residuals and Model Selection**

In the traditional world, an actuary’s methods and selections are defended by his/her expertise and experience. In a modeling world, mathematical and graphical tools can provide more objective ways to defend one’s selections and to communicate one’s conclusions. One of the most important diagnostic and validation tools are residuals, which are in general the difference between a data set and its “formulaic representation.” For FFM, the formulaic representation of the data is given by the model specification  $(\hat{f}, \hat{\alpha})$  and the corresponding residuals are defined as

$$r_{i,k} := r_{i,k}(\hat{f}, \hat{\alpha}) := (C_{ik+1} - \hat{f}_k C_{ik}) / (\hat{\sigma}_k C_{i,k}^{\hat{\alpha}_k / 2}) \tag{5}$$

Now, given a set of selected link ratios, how does the actuary confidently defend the resulting estimate of the unpaid claim liability? The first step is to demonstrate that the corresponding  $\alpha$  parameters lead to residuals  $\{r_{i,k}\}$  that “look like noise.” This “noise hypothesis” – i.e., the residuals are independent and identically distributed normal random variables – can be tested visually (e.g., QQ-plots) as well as with “hard” statistics (e.g., Shapiro-Francia-test for normality [5]). If the test fails and one chooses to adjust the selections, how does one know if the new set of link ratios are “better” than the initial selections?

The raising and answering of these questions within a reserve analysis is encapsulated by an analytical flow which we call the “actuarial validation cycle,” illustrated in Figure 1 below:



The actuarial validation cycle underscores the idea that models offer proposals to understand the data structure.

Figure 1 illustrates that a failed validation step leads to re-selecting the initial model. Selecting a model other than FFM is certainly an option, but that decision and its implications are beyond the scope of this paper.

Assumptions *per se* can be argued but not tested. Assumptions formed as *hypotheses*, however, can be mathematically tested by their implied residuals. The FFM approach to the traditional chain ladder practice of selecting link ratios is one way to test and validate those selections objectively. There may be others. To cite George Box, “Essentially, all models are wrong, but some are useful.”

#### 4. An Example

We consider the triangle in Table 1 of RAA data quite well analyzed in Mack [1], Zehnwirth [3] and elsewhere in the literature. We consider it here within the FFM framework to illustrate possible iterations through the actuarial validation cycle of **Figure 1**.

**Table 1**

5,012	8,269	10,907	11,805	13,539	16,181	18,009	18,608	18,662	18,834
106	4,285	5,396	10,666	13,782	15,599	15,496	16,169	16,704	
3,410	8,992	13,873	16,141	18,735	22,214	22,863	23,466		
5,655	11,555	15,766	21,266	23,425	26,083	27,067			
1,092	9,565	15,836	22,169	25,955	26,180				
1,513	6,445	11,702	12,935	15,852					
557	4,020	10,946	12,314						
1,351	6,947	13,112							
3,133	5,395								
2,063									
<b>Simple Average</b>	8.206	1.696	1.315	1.183	1.127	1.043	1.034	1.018	1.009
<b>Weighted Average</b>	2.999	1.624	1.271	1.172	1.113	1.042	1.033	1.017	1.009

First we declare our *goal*, which is to find a model that describes our data within a certain level of confidence.

- Model Selection: We start with the FFM chain ladder model, which means that we believe cumulative losses behave according to the equation

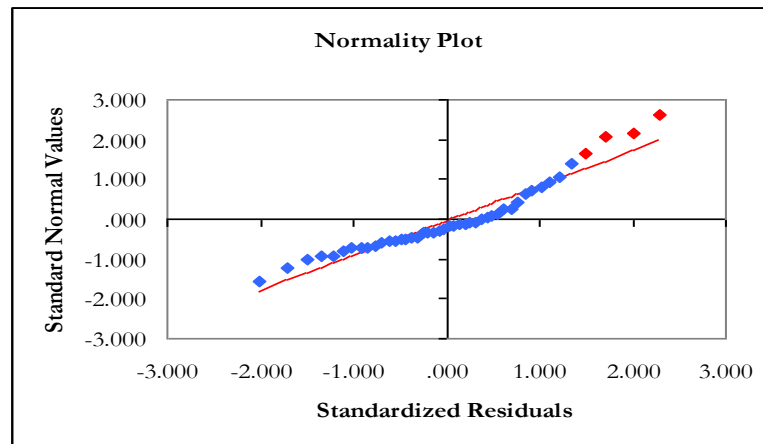
$$C_{ik+1} = f_k C_{ik} + \sigma_k \varepsilon_{i,k} C_{i,k}^{\alpha_k / 2}$$

- Parameter Selection: This means that we choose a set of link ratios, then calculate the corresponding  $\alpha$ , which in turn determines the variance assumption. We start here by selecting the simple averages shown above.
- Model Validation: Now we test the corresponding residuals shown in Table 2.

**Table 2**

-0.5313	-0.7949	-0.7322	-0.5395	0.9132	1.3861	-0.1275	-0.7071
2.6108	-0.9210	2.0882	1.6351	0.0653	-0.9937	1.0576	0.7071
-0.4513	-0.3229	-0.4763	-0.3326	0.7867	-0.2809	-0.9301	
-0.4994	-0.6992	0.1083	-1.2187	-0.1807	-0.1115		
0.0448	-0.0850	0.2693	-0.1818	-1.5844			
-0.3198	0.2526	-0.6596	0.6376				
-0.0801	2.1662	-0.5977					
-0.2483	0.4040						
-0.5254							

In the graph below, the residuals appear fairly random. A few of the residuals (the red ones) are outliers.



**Figure 2: Residuals based on simple average link ratio selections versus quantiles of the normal distribution (red line)**

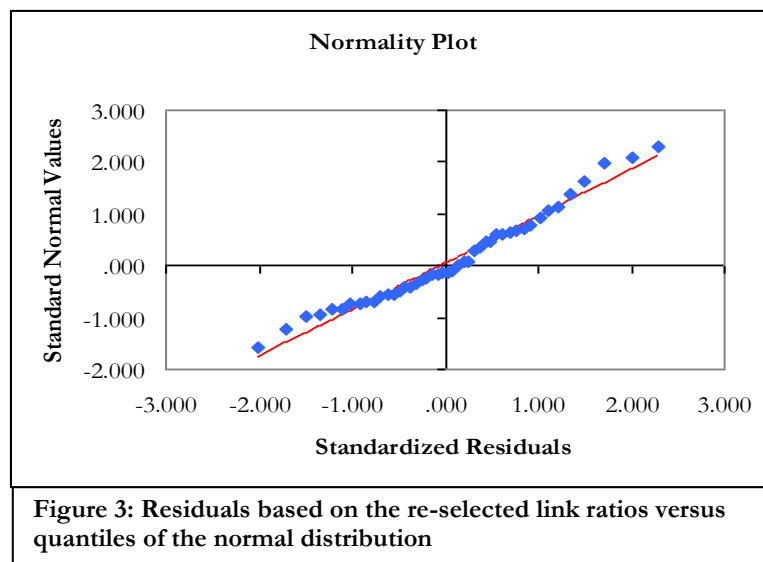
Besides the visual diagnostic above, we want to check the “noise hypothesis” with an objective statistical test. Here the Shapiro-Francia P-Value is 0.26% which suggests that the assumption of normality of the residuals is rejected at the 5.0% confidence level. (When the P-Value is less than one’s predetermined confidence level, the null hypothesis – i.e., that the residuals are i.i.d. normal – should be rejected.) This means we need to go back to step one.

- Model (Re-)Selection: Within the scope of this paper we stay within the FFM framework.

- **Parameter (Re-)Selection:** The first few link ratios produce outliers in our first iteration, so we might change the first three selected link ratios to volume weighted averages. In our second iteration we would select:

<b>Selection</b>	2.999	1.624	1.271	1.183	1.127	1.043	1.034	1.018	1.009
<b>alpha</b>	1.000	1.000	1.000	2.000	2.000	2.000	2.000	2.000	

- **Model Validation:** By comparing Figure 2 and Figure 3, we see that the re-selected link ratios lead to residuals that have a much better appearance of being a random sample from a normal distribution. The Shapiro-Francia test delivers a P-Value of 12.0%, so given our 5% confidence level we would accept this model, the selected parameters, the corresponding liability estimates, and the standard errors.



## 5. Comparing Uncertainty Estimates

In practice today it is not uncommon to find coefficients of variation (CV's) based on Mack's volume-weighted-average standard error formulas applied to chain ladder projections based on selected link ratios that are not volume weighted averages. The resulting uncertainty estimates can be suspect due to this fundamental inconsistency. The FFM model eliminates this inconsistency by making sure that all reasonably selected link ratios are best linear unbiased estimators for an underlying model of the data, and the uncertainty estimates resulting from the FFM formulas are consistent with those selections.

To illustrate this point, Table 3 below compares the standard errors of the Mack and FFM models for the RAA triangle (Section 4) when the selected factors are the volume weighted averages.

Table 3 - Standard Errors based on volume weighted average factors

AY	FFM results			Mack results		
	Process risk	Parameter risk	Total risk	Process risk	Parameter risk	Total risk
i=2	150	142	206	150	142	206
i=3	470	410	623	470	410	623
i=4	549	507	747	549	507	747
i=5	1,227	809	1,470	1,227	809	1,469
i=6	1,824	826	2,002	1,824	825	2,002
i=7	2,042	844	2,209	2,042	844	2,209
i=8	4,947	2,058	5,359	4,947	2,057	5,358
i=9	6,035	1,925	6,334	6,035	1,921	6,333
i=10	23,464	7,325	24,581	23,464	7,276	24,566
<b>Total:</b>	24,920	10,193	26,924	24,920	10,153	26,909

The total risk CV of the liability for all accident years combined is 51.6%. The similarity of results is not surprising since, as we saw in Section 1, Mack’s model is a special case of the FFM.<sup>14</sup>

Now, suppose one selected the following link ratios for the RAA data:

Table 4 – Alternative link ratio selections based on judgment

<u>1 to 2</u>	<u>2 to 3</u>	<u>3 to 4</u>	<u>4 to 5</u>	<u>5 to 6</u>	<u>6 to 7</u>	<u>7 to 8</u>	<u>8 to 9</u>	<u>9 to 10</u>
3.500	1.750	1.275	1.175	1.112	1.040	1.035	1.018	1.009

The FFM formulas result in a total risk overall CV of the liability for all accident years combined of 63.8%. To impute the Mack-formula based CV of 51.6% to the estimated liability from these link ratios would understate the total risk by about 19% (1-.516/.638).

## 6. Conclusion and Further Research

Given reasonably selected link ratios, we have shown how the Flexible Factor Model

- reproduces the point estimates of the traditional chain ladder methodology,
- determines estimates of risk consistent with those point estimates,
- offers a framework for statistically objective diagnostic and validation tools, and
- enhances the analytical reserving work flow.

<sup>14</sup> As mentioned above, the uncertainty estimators of the two models will agree with the exclusion of the third term (the product of the variances) from the parameter risk formulas of the FFM.



Development of similar results for other deterministic methods – such as Bornhuetter-Ferguson, Cape-Cod, and Munich Chain Ladder – seems feasible. Various bootstrapping techniques could be conducted on the FFM residuals, emphasizing the role residuals play in assuring meaningful results. A Bayesian approach could prove fruitful, where one defines a “prior” for the  $\alpha_k$  and derives the *a posteriori* distribution for the variance assumption. However, if FFM is too simplistic to model the data appropriately, a natural next step would be to introduce an intercept term to the regression model as suggested in Murphy [2].

## Appendix A

### Proof of Theorem 1.1 (Link Ratio Function)

1. If  $LR_k : \mathfrak{R} \rightarrow \mathfrak{R}$  is a differentiable function and in particular continuous, its range is an interval in the set of real numbers.
2. We first note for arbitrary  $\alpha$  that  $\sum_{j=1}^{n-k} w_{j,k}^\alpha = 1$ . Without loss of generality we assume  $C_{i_{\min},k} < C_{j,k}, (j \leq I-k)$ . It is now sufficient to prove  $w_{i_{\min},k}^\alpha \rightarrow 1$  as  $\alpha \rightarrow \infty$ . This can be seen by rewriting the weight

$$w_{i_{\min},k}^\alpha = C_{i_{\min},k}^{2-\alpha} / \sum_{j=1}^{n-k} C_{j,k}^{2-\alpha} = C_{i_{\min},k}^2 / \sum_{j=1}^{n-k} C_{j,k}^2 \cdot (C_{i_{\min},k} / C_{j,k})^\alpha .$$

Obviously all  $(C_{i_{\min},k} / C_{j,k}) < 1, j \neq i_{\min}$ , thus all terms converge to 0 except for  $j = i_{\min}$ , so that we see  $\sum_{j=1}^{n-k} C_{j,k}^2 \cdot (C_{i_{\min},k} / C_{j,k})^\alpha \rightarrow C_{i_{\min},k}^2$  as  $\alpha \rightarrow \infty$ .

3. Similar to 2 we can deduce:  $w_{i_{\max},k}^\alpha \rightarrow 1$  as  $\alpha \rightarrow -\infty$ .
4. The weighted average and the simple average correspond to  $LR_k(2), LR_k(1)$  respectively. This, with 1 above, proves the theorem.

The following example illustrates the function  $LR_k(\alpha)$  with an example, where  $F_{i_{\min},k} = F_{i_{\max},k} = 2.5$ . This is a case, where for all link ratios, except for the minimum for  $\alpha = 0$ , there are two different variance assumptions, which lead to the same link ratio. Also the infinitesimal behavior of the function is shown in the accompanying graph.

**Table 5: Link Ratio Example**

	152	380	<b>2.500</b>
	185	449	2.425
	217	537	2.478
	250	550	2.201
	262	655	<b>2.500</b>
	235	466	1.985
	207	411	1.989
	185	372	2.011
<b>Simple Average:</b>	$\alpha=2$		<b>2.261</b>
<b>VW Average:</b>	$\alpha=1$		<b>2.258</b>
	$\alpha=0$		<b>2.243</b>

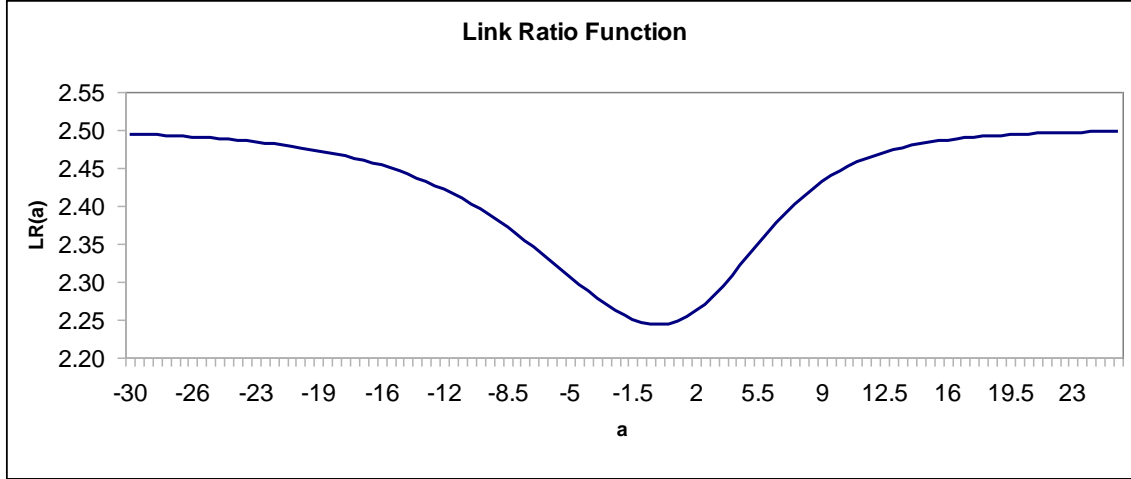


Figure 4: Reasonable link ratios derived from the Link Ratio Function

### Proof of Theorem 1.2

Using Theorem 1.1 we observe that the set  $\{\alpha \in \mathfrak{R} \mid h_k = \mathbf{LR}(\alpha)\}$  is not empty. Furthermore we note that  $h_k = \mathbf{LR}(\alpha) \Leftrightarrow (h_k \cdot \sum_{j=1}^{n-k} C_{j,k}^{2-\alpha} - \sum_{i=1}^{n-k} C_{i+1,k} C_{i,k}^{1-\alpha}) = 0$ , which can be solved with an appropriate numerical solver algorithm. In particular the Newton-Raphson algorithm can be easily employed. If we consider the  $h_k$  equation described above as a function of  $\alpha$ , noted as  $f(\alpha)$ , the Newton-Raphson algorithm calculates an appropriate  $\alpha$  that serves as a root of the equation, i.e.  $f(\alpha)=0$ . The approximation of the root is achieved by calculating successive tangents of  $f(\alpha)$  by generating the sequence  $\{p_n\}$  defined by:

$$p_n = p_{n-1} - \frac{f(p_{n-1})}{f'(p_{n-1})} \text{ (for } n \geq 1\text{)}.$$

More than one solution can be produced by the application of the Newton-Rahpson algorithm. Consider again the example in Table 5 above where we get two solutions for the link ratio 2.400: -10.5 and 7.5, thus we set the variance estimation to  $\max(-10.5, 7.5)=7.5$ .

### Proof of the Parameter Risk Formulas – single accident year

For the first period after the current diagonal,  $\hat{C}_{i,k+1} = \hat{f}_k C_{i,k}$ , so  $\Delta^2(\hat{C}_{i,k+1}) = C_{i,k}^2 \Delta^2(\hat{f}_k^2)$  since  $C_{i,k}^2$  is a constant.

For  $s > 1$  periods after the current diagonal,  $\hat{C}_{i,k+s} = \hat{f}_{k+s-1} \hat{C}_{i,k+s-1}$ , so based on the “law of total variance”:

$$\begin{aligned} \Delta^2(\hat{C}_{i,k+s}) &= E(\text{Var}(\hat{C}_{i,k+s} \mid \hat{C}_{i,k+s-1})) + \text{Var}(E(\hat{C}_{i,k+s} \mid \hat{C}_{i,k+s-1})) \\ &= E(\hat{C}_{i,k+s-1}^2 \text{Var}(\hat{f}_{k+s-1})) + \text{Var}(\hat{C}_{i,k+s-1} E(\hat{f}_{k+s-1})) \\ &= \text{Var}(\hat{f}_{k+s-1}) E(\hat{C}_{i,k+s-1}^2) + \text{Var}(\hat{C}_{i,k+s-1} \hat{f}_{k+s-1}) \\ &= \text{Var}(\hat{f}_{k+s-1}) (\text{Var}(\hat{C}_{i,k+s-1}) + E^2(\hat{C}_{i,k+s-1})) + \hat{f}_{k+s-1}^2 \text{Var}(\hat{C}_{i,k+s-1}) \\ &= \mu_{i,k+s-1}^2 \Delta^2(\hat{f}_{k+s-1}) + \hat{f}_{k+s-1}^2 \Delta^2(\hat{C}_{i,k+s-1}) + \Delta^2(\hat{f}_{k+s-1}) \Delta^2(\hat{C}_{i,k+s-1}). \end{aligned}$$

### Proof of the Process Risk Formulas – single accident year

For the first period after the current diagonal,  $\Gamma(C_{i,k+1}) = C_{i,k}^{\alpha_k} \sigma_k^2$ . For  $s > 1$  periods after the current diagonal, process risk can be calculated recursively according to the formula:

$$\Gamma^2(C_{i,k+s}) = \hat{f}_{k+s-1}^2 \cdot \Gamma^2(C_{i,k+s-1}) + E(C_{i,k+s-1}^{\alpha_{k+s-1}} \mid D) \sigma_{k+s-1}^2$$

#### Proof:

For the first period after its current age ( $s=1$ ) the process risk for  $C_{i,k+1}$  comes directly from assumption (1):

$$\Gamma^2(C_{i,k+1}) = C_{i,k}^{\alpha_k} \sigma_k^2 \quad (5)$$

because  $C_{i,k}^{\alpha_k}$  is a known constant.

For  $s > 1$  we again rely on the “law of total variance”:

$$\begin{aligned} \Gamma^2(C_{i,k+s}) &= E(\text{Var}(C_{i,k+s} \mid D)) + \text{Var}(E(C_{i,k+s} \mid D)) \\ &= E(C_{i,k+s-1}^{\alpha_{k+s-1}} \sigma_{k+s-1}^2 \mid D) + \text{Var}(E(\hat{f}_{k+s-1} C_{i,k+s-1}) \mid D) \\ &= E(C_{i,k+s-1}^{\alpha_{k+s-1}} \mid D) \sigma_{k+s-1}^2 + \hat{f}_{k+s-1}^2 \Gamma^2(C_{i,k+s-1}) \end{aligned}$$

As explained in the text we favor approximating  $E(C_{i,k+s-1}^{\alpha_{k+s-1}} \mid D)$  in practice with  $(E(C_{i,k+s-1} \mid D))^{\alpha_{k+s-1}} \cdot \Psi$ , where factor  $\Psi$  is a function of  $\alpha$  and the coefficient of variation  $\kappa$ .

For estimates of  $\Gamma^2$ , we replace all unknown quantities by their best estimates:  $f_k$  by  $\hat{f}_k$ ,  $\sigma_k$  by  $\hat{\sigma}_k$ , etc. Again we note here that  $\hat{\sigma}_k^2$  and  $\hat{f}_k^2$  both depend on  $\hat{\alpha}_k$ . However we drop the functional notation  $\hat{\sigma}_k^2(\hat{\alpha}_k)$  and  $\hat{f}_k^2(\hat{\alpha}_k)$  for convenience of presentation.

**Proof of the Parameter Risk Formulas – all accident years combined**

For  $j=3, 4, \dots$ ,  $\hat{X}_j = \hat{f}_{j-1} \cdot (\hat{X}_{j-1} + C_{I-j+2, j-1})$ , where  $I-j+2$  is the only accident year that has matured as of age  $j-1$ . By employing the “law of total variance” mentioned above, we have:

$$\begin{aligned} \Delta^2(\hat{X}_j) &= E(\text{Var}(\hat{X}_j | \hat{X}_{j-1})) + \text{Var}(E(\hat{X}_j | \hat{X}_{j-1})) \\ &= E(\text{Var}(\hat{f}_{j-1}(\hat{X}_{j-1} + C_{I-j+2, j-1}) | \hat{X}_{j-1})) + \text{Var}(E(\hat{f}_{j-1}(\hat{X}_{j-1} + C_{I-j+2, j-1}) | \hat{X}_{j-1})) \\ &= E((\hat{X}_{j-1} + C_{I-j+2, j-1})^2 \text{Var}(\hat{f}_{j-1} | \hat{X}_{j-1})) + \text{Var}((\hat{X}_{j-1} + C_{I-j+2, j-1}) E(\hat{f}_{j-1} | \hat{X}_{j-1})) \\ &= \Delta^2(\hat{f}_{j-1}) E((\hat{X}_{j-1} + C_{I-j+2, j-1})^2) + \text{Var}(f_{j-1}(\hat{X}_{j-1} + C_{I-j+2, j-1})) \\ &= \Delta^2(\hat{f}_{j-1}) \{ \text{Var}(\hat{X}_{j-1}) + E^2(\hat{X}_{j-1} + C_{I-j+2, j-1}) \} + f_{j-1}^2 \text{Var}(\hat{X}_{j-1}) \\ &= (M_{j-1} + C_{I-j+2, j-1})^2 \Delta^2(\hat{f}_{j-1}) + f_{j-1}^2 \Delta^2(\hat{X}_{j-1}) + \Delta^2(\hat{f}_{j-1}) \Delta^2(\hat{X}_{j-1}), \end{aligned}$$

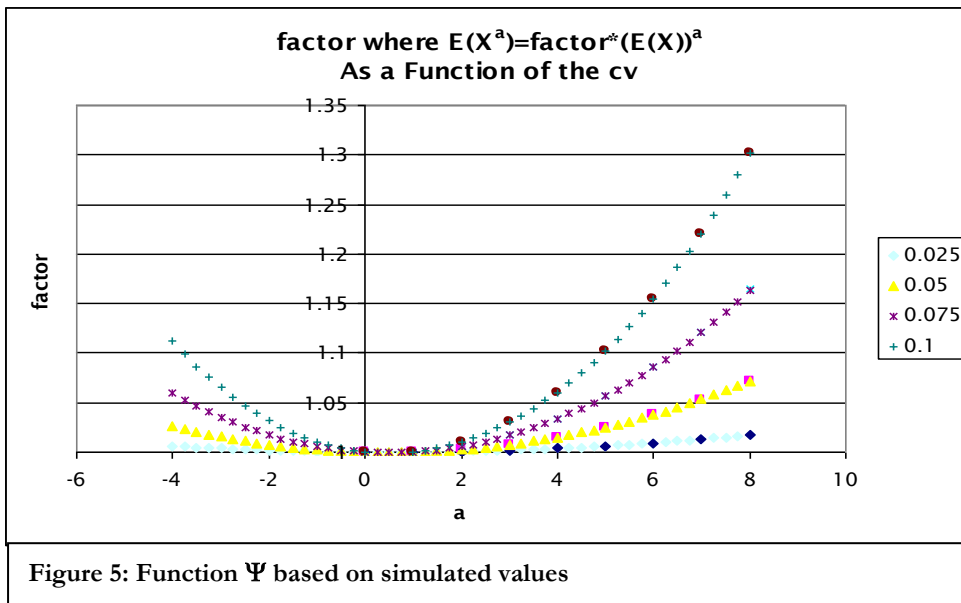
since  $C_{I-j+2, j-1}$  is a constant.

**Proof of the Process Risk Formulas – all accident years combined**

The formula for process risk is straightforward since all accident years are assumed to be independent and the process variance of the sum of the losses for all accident years is the sum of the process variance of each accident year.

**Process Risk Function  $\Psi$  based on simulations**

Results of simulations calculating the function  $\Psi$  as a ratio of  $E(X^a)$  over  $(E(X))^a$  for a truncated-normal random variable  $X$  are shown in Figure 5 below.



## Appendix B

### Estimating the $\Psi$ Function in R<sup>15</sup>

To approximate  $\Psi(\alpha, cv) = E(X^\alpha) / E(X)^\alpha$  we simulate many normal variates  $\mathbf{X}$  with coefficient of variation  $cv$ , and calculate  $mean(X^\alpha) / (mean(X))^\alpha$  for our  $\alpha$  of interest. Technically,  $X^\alpha$  is only defined on the positive support of  $X$  when  $\alpha$  is not a whole number, so we employ rejection sampling<sup>16</sup> to ensure that  $\mathbf{X}$  consists of positive values only. The R function in Figure 6 creates a sample of size 10000 of positive-only pseudo-normal random variates.<sup>17</sup>

```

rnorm.positive <- function(mu, sigma) {
  sampl <- rnorm(10000, mu, sigma) # simulated normals
  negative <- sampl <= 0 # flag the negative values
  while (any(negative)) { # resample those cells
    sampl[negative] <- rnorm(sum(negative), mu, sigma)
    negative <- sampl <= 0
  }
  sampl # the final sample
}

```

**Figure 6: Generate a sample of size 10000 of positive pseudo-normal random variates**

Unfortunately we cannot simply set  $\mu=1$ ,  $\sigma=cv$  and use the resulting random sample because the sample  $cv$  may significantly differ from the input  $cv$ , especially for large values of the target  $cv$ . To illustrate, when the target  $cv$  is small, say 0.2,

```

> set.seed(2009) # so results can be duplicated
> X<-rnorm.positive(1, 0.2)
> cv<-sd(X)/mean(X) # the sample cv
[1] 0.2004325

```

the sample  $cv$  is close to the input  $\sigma=cv$ , but for a larger target such as 0.8

```

> set.seed(2009)
> X<-rnorm.positive(1, 0.8)
> cv<-sd(X)/mean(X)
[1] 0.5818142

```

the sample  $cv$  is far from the input  $\sigma=cv$ . Therefore, for any given target  $cv$  we first find a  $(\mu, \sigma)$  pair such that the `rnorm.positive` function builds a sample whose sample  $cv$  is as close as possible to the target  $cv$ . To find that pair, we use R's `optim` function. For example, in the "R session" below we see that for a target  $cv$  of 0.8, a sample of 10000 positive pseudo-normal variates  $\mathbf{X}$  generated from  $\mu = -1.196564$  and  $\sigma = 4.676847$  will have a sample coefficient of variation close to that target:

<sup>15</sup> R is a statistical computing and graphics software environment widely used for academic and commercial research, and supported by a worldwide community. R is available for free at <http://www.r-project.org>.

<sup>16</sup> For an example of a similar application of rejection sampling, see <http://www.biostat.wustl.edu/archives/html/s-news/2001-04/msg00033.html>

<sup>17</sup> In R, text following the `#`-sign are comments.

```

> set.seed(2009)
> S<-optim(c(1,.8), # vector of mu, sigma starting values
  sample.cv.distance, # function to minimize
  gr=NULL, # no gradient function provided to optim
  0.8, # desired target cv needed by sample.cv.distance
  method="BFGS") # quasi-Newton method works well here
> S$par
[1] -1.196564  4.676847
> X.8<-rnorm.positive(-1.196564,4.676847)
> sd(X.8)/mean(X.8)
[1] 0.787364 # sample cv is close to 0.8 target

```

For those new to R, the above warrants some explanation. `optim` tries to minimize the function `sample.cv.distance` (Figure 7) by an intelligent search through all possible  $(\mu, \sigma)$  pairs

```

sample.cv.distance <- function(musigma, targetcv) {
  mu <- musigma[1]      # mu=1st element of musigma vector
  sigma <- musigma[2]   # sigma=2nd element
  if (sigma<=0) return(100) # to avoid sigma<=0 solutions
  y <- rnorm.positive(musigma[1],musigma[2]) # the sample
  abs(sd(y)/mean(y)-targetcv) # the distance
}

```

Figure 7: function we want `optim` to minimize

(Note: It is possible for `optim` to try a `musigma` pair containing a negative value for `sigma`; `sample.cv.distance` penalizes such out-of-bounds tries by returning a large “distance”.)

starting with  $(1, 0.8)$ . Each time `sample.cv.distance` is called, it generates an `rnorm.positive` sample – depending on the `musigma` vector that `optim` sends it – and returns the distance between the cv of that sample and the target  $cv$  (0.8 in the session above). When `optim` decides it has found the minimum possible distance, it returns the  $(\mu, \sigma)$  solution vector in its `$par` component, referenced as `S$par` in the session above.

We now use our sample **X.8** generated in the session above to estimate  $\Psi(\alpha, cv=0.8)$  for negative values of  $\alpha$ . For example,

```

> mean(X.8^(-.5)) / (mean(X.8))^(-.5)
[1] 1.309064

```

shows that  $\Psi(-0.5, 0.8)$  is approximately 1.31 and

```

> mean(X.8^(-2)) / (mean(X.8))^(-2)
[1] 1682.209

```

shows that  $\Psi(-2, 0.8)$  is a staggering 1682. We could use **X.8** to estimate  $\Psi(\alpha, 0.8)$  for positive  $\alpha$  too, rather than linearly interpolate between integer values per Section 2. For example, if  $\alpha=1.5$  – for a selected ATA between the weighted ( $\alpha=1$ ) and simple ( $\alpha=2$ ) averages – the estimate of  $\Psi(1.5, 0.8)$  is

```

> mean(X.8^1.5) / (mean(X.8))^1.5
[1] 1.128022

```

which is less than the linearly interpolated value, 1.32.<sup>18</sup>

<sup>18</sup> From the formula for  $\Psi(n, \kappa)$  in Section 2,  $\Psi(1, 0.8)=1$  and  $\Psi(2, 0.8)=1+(0.8)^2=1.64$ .

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-



# Capital Allocation Methods—Policyholder vs. Shareholder Perspectives

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**Abstract:** A key component of actuarial pricing involves the allocation of the required risk load down to the individual policy level. This allocation generally depends on a corporate risk measure. However, an often unanswered or even unaddressed question involves the perspective of the risk measure; specifically, shareholders and policyholders naturally have very different inherent viewpoints of the risk distribution. This paper discusses the implications of these differing risk viewpoints on policy pricing. In addition, the paper describes the problem within the context of the theory of financial economics, and concludes with some recommendations and opinions on the current state of risk allocation in the actuarial profession.

---

## INTRODUCTION

In order to price an insurance policy or book of business, most actuarial methods require some sort of an allocation of either the corporate surplus or the total corporate risk load. This allocation is generally accomplished by means of a risk measure. There is, however, a very fundamental – and often unaddressed – issue regarding this risk measure: should the risk measure reflect a policyholder or a shareholder viewpoint?

Policyholders and shareholders will be expected to possess a very different set of risk preferences. As Glenn Meyers points out, “from policyholder’s standpoint, the only risk that matters is insurer insolvency.” [1] Shareholders, on the other hand, may be more concerned about the total spectrum of adverse outcomes, including any outcome in which actual return on contributed surplus falls short of expected return. Moreover, policyholders distinguish between “degrees” of insolvency, whereas once the surplus is “wiped out” shareholders are unconcerned about just how “bad” any resulting policyholder shortfalls may be. From a company management or shareholder perspective, Kreps expresses this idea as follows: “once you are buried, it doesn’t matter how much dirt is on top.” [2] But for policyholders, the amount of “dirt on top” at the funeral (the so-called “policyholders deficit”) is a critical consideration.<sup>1</sup>

In this paper, we will provide a simple pricing example, in order to illustrate and discuss some common actuarial allocation techniques from both a shareholder and policyholder perspective. From an actuarial viewpoint, we will discuss both the capital allocation and the Ruhm/Mango/Kreps (or “RMK”) approaches to a solution. We will also provide a financial pricing

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<sup>1</sup> It is important to note that the existence of guaranty funds can influence the policyholder’s perspective of risk. For lines that are subject to guaranty fund protection, policyholders of insolvent insurance companies may be able to obtain reimbursement from the guaranty fund; however, the recovery may not be complete, and will generally involve significant delays and uncertainties.

solution. The paper will close with some general conclusions and recommendations.

## Capital Allocation Methods

Let's start by framing the problem in statistical terms. Assume that a newly-formed insurance company will write  $n$  contracts or segments, with losses on each of the contracts payable at the end of one year. For each contract/segment, losses are represented by the random variable  $X_i$ ,  $i = 1, 2, \dots, n$ . Aggregate losses for the insurance company are denoted by the random variable  $Y$ , where  $Y = \sum X_i$ . We will ignore underwriting and loss adjustment expenses, as well as federal income taxes.

The actuarial allocation problem involves the determination of the premium,  $P_i$ , to be charged (at the beginning of the year) for each of these  $n$  policies. Most actuarial allocation methods assume – either explicitly or implicitly – that there is some overall *corporate* goal, such as a target return-on-equity (ROE). In many actuarial methods, this corporate goal applies *separately* to each individual policy or segment as well; in other words, the premium for *each* of these  $n$  policies is also required to satisfy this corporate goal.

This determination generally involves an allocation of the insurance company's total surplus to each individual contract. In order to allocate surplus, we require both a *total risk measure*, and an *allocation rule* for pushing that total risk measure down to the contract level. The total risk measure, or  $p(Y)$ , is usually a function of the aggregate corporate loss random variable. The allocation rule, or  $r(X_i)$ , is a function that applies separately to the loss random variable for each of the  $n$  policies. Generally we look for an allocation rule that sums up to the total risk measure – that is,  $\sum r(X_i) = p(Y)$ .<sup>2</sup> Surplus is then allocated in proportion to the allocation of the risk measure.

### A Simple Pricing Example

In order to clearly illustrate the ideas involved, let's focus on a very simple, illustrative pricing example. Assume that a start-up insurance company has been formed to write two lines of business, auto physical damage (APD) and catastrophe reinsurance (Cat). Aggregate losses are payable at the end of one year, but vary by state-of-the-world according to the following table:

State-of-World	State Probability	Total APD Loss	Total Cat Loss	Total Company Loss
Good	50.0%	\$80	\$10	\$90
Bad	49.5%	\$120	\$10	\$130
Ugly	0.5%	\$120	\$300	\$420
Expected Value		\$100	\$11.45	\$111.45

Following the notation introduced above, let  $X_{apd}$  be the random variable for APD losses;  $X_{cat}$  is the Cat loss random variable; and  $Y$  is the total company loss random variable, where  $Y = X_{apd} + X_{cat}$ .

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<sup>2</sup> The notation here is borrowed from Venter, Major & Kreps [3].

Shareholders have contributed \$150 of up-front capital to fund this new company; we will assume that shareholders require a 10% per annum return on this capital investment. The risk-free rate is 5% per annum. Also, assume that the insurance company’s asset portfolio will be invested at the risk-free rate of 5%. In order for shareholders to achieve an expected return of 10%, the *total* corporate premium must be equal to \$113.29.<sup>3</sup>

As a first attempt, let’s utilize excess tail value at risk (XTVaR) as our total risk measure. The XTVaR risk measure is specified as follows:  $p(Y) = E[Y - E(Y) \mid Y > b]$ , where  $b$  is a *cutoff point* for the losses. For this risk measure, we also have a natural allocation rule given by  $r(X_i) = E[X_i - E(X_i) \mid Y > b]$ . This also happens to be an additive allocation rule; that is  $\sum r(X_i) = p(Y)$ .<sup>4</sup> For a cutoff point, we will use  $b = \$276.45$ , which is the amount of aggregate losses which will entirely “wipe out” the insurance company’s surplus. In this sense, our risk measure is really focusing on the *risk of insolvency* to the insurance company.

For this measure, we can easily calculate both the total risk, and the allocation of that risk to component:

$$p(Y) = E[Y - E(Y) \mid Y > \$276.45] = \$420 - \$111.45 = \$308.55$$

$$r(X_{apd}) = E[X_{apd} - E(X_{apd}) \mid Y > \$276.45] = \$120 - \$100 = \$20$$

$$r(X_{cat}) = E[X_{cat} - E(X_{cat}) \mid Y > \$276.45] = \$300 - \$11.45 = \$288.55$$

Surplus is then allocated in proportion to the allocation of the risk measure, or 6.5% ( $\$20/\$308.55$ ) to APD and 93.5% ( $\$288.55/\$308.55$ ) to Cat. This results in the following allocation of the \$150 surplus: \$9.75 to APD, and \$140.25 to Cat. The higher allocation to the Cat line reflects that line’s much greater relative contribution to the insolvency risk of the company.

Lastly, we need to determine the premiums that result in an expected ROE of 10% for each line. The resulting premiums are \$95.70 for APD and \$17.59 for Cat, as demonstrated in the following table:

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<sup>3</sup> Assuming that the entirety of the premium is paid up-front, then assets at the beginning of the year are equal to the total premium of \$113.29 plus total surplus of \$150, which equals \$263.29. At the 5% risk-free rate, assets at the end of the year are equal to  $\$263.29 \times 1.05 = \$276.45$ . With expected aggregate losses of \$111.45, the expected surplus at the end of the year equals  $\$276.45 - \$111.45 = \$165$ . Thus, the expected return on surplus is  $\$165 / \$150 - 1 = 10\%$ .

<sup>4</sup> See Venter, Major & Kreps [3].

	APD	Cat
(1) Premium	\$95.70	\$17.59
(2) Allocated Surplus	\$9.75	\$140.25
(3) Assets at Beginning of Year = (1) + (2)	\$105.45	\$157.84
(4) Assets at Year-End = (3) x 1.05	\$110.72	\$165.73
(5) Expected Loss at Year-End	\$100	\$11.45
(6) Expected Surplus at Year-End = (4) - (5)	\$10.72	\$154.28
(7) Expected Return on Surplus = (6) / (2) - 1.0	10%	10%

### Policyholder Versus Shareholder Risk Measures

The resulting premiums in the example above are dependent on the surplus allocation, which depends on both the total risk measure and the allocation rule. The question, then, that naturally arises is “how do we know that we have selected the ‘right’ total risk measure?”

In the previous solution, we utilized a risk measure that focused on the risk of insolvency, or the total depletion of surplus. As discussed earlier, an insolvency-based risk measure is appropriate from the standpoint of the *policyholder*. In our example, policyholders are only concerned about the loss outcome in the “Ugly” scenario; in this scenario, year-end assets will be inadequate to cover year-end losses, leaving the company unable to fully meet its obligation to policyholders.<sup>5</sup>

On the other hand, *shareholders* may be concerned about more than just insolvency risk. Shareholders have invested the \$150 of surplus in this company in the hopes of realizing an acceptable return on that investment. As such, shareholders may also be concerned about scenarios in which the total return on this investment falls short of their 10% expected/required return. That is, in terms of the loss outcomes, shareholders are potentially concerned about any scenario in which the actual corporate loss exceeds its expected value. In our example, this occurs under both the “Bad” and the “Ugly” scenario.

Alternatively, shareholders may be concerned about any outcome which involves a loss of capital, or so-called “capital consumption”. Mango [4] uses the notion of an “experience account” from finite reinsurance to explain the concept of capital consumption. Specifically, any scenario in which total costs exceed total revenues – where revenues include both premiums and investment income on collected premiums – creates an operating deficit, or a “capital consumption”. In our example, the total premium invested at the risk-free rate results in a total revenue flow of  $\$113.29 \times 1.05 = \$118.95$ . Thus, any aggregate loss in excess of \$118.95 results in a loss of capital, and this occurs under both the “Bad” and the “Ugly” scenario.

For the sake of comparison, let’s re-do the pricing example using capital consumption as the risk measure. Specifically, we will maintain the XTVaR model, but we will now set the cutoff point  $b$

<sup>5</sup> Many other policyholder risk measures are possible. For example, we could also use probability of ruin or expected policyholder deficit as the total risk measure.

equal to the capital consumption point of \$118.95. This results in the following risk allocation:

$$p(Y) = E[Y - E(Y) \mid Y > \$118.95] = (0.495/0.500) \times (\$130 - \$111.45) + (0.005/0.500) \times (\$420 - \$111.45) = \$21.45$$

$$r(X_{\text{apd}}) = E[X_{\text{apd}} - E(X_{\text{apd}}) \mid Y > \$118.95] = (0.495/0.500) \times (\$120 - \$100) + (0.005/0.500) \times (\$120 - \$100) = \$20$$

$$r(X_{\text{cat}}) = E[X_{\text{cat}} - E(X_{\text{cat}}) \mid Y > \$118.95] = (0.495/0.500) \times (\$10 - \$11.45) + (0.005/0.500) \times (\$300 - \$11.45) = \$1.45$$

The \$150 of capital is then allocated in proportion to the risk measure allocation, resulting in the following capital allocation: \$139.86 to APD, and \$10.14 to cat. Finally, we determine the premiums that result in an expected ROE of 10% for each line, as shown in the following table:

	APD	Cat
(1) Premium	\$101.90	\$11.39
(2) Allocated Surplus	\$139.86	\$10.14
(3) Assets at Beginning of Year = (1) + (2)	\$241.76	\$21.53
(4) Assets at Year-End = (3) x 1.05	\$253.85	\$22.61
(5) Expected Loss at Year-End	\$100.00	\$11.45
(6) Expected Surplus at Year-End = (4) - (5)	\$153.85	\$11.16
(7) Expected Return on Surplus = (6) / (2) - 1.0	10%	10%

Note the large impact of the selected cutoff point on the resulting premiums. In particular, the policyholder (or insolvency) based allocation rule assigned a *much* higher capital amount, and resulting premium, to the Cat line than the shareholder (or “capital consumption”) based allocation rule. Of course, this is an over-simplified and carefully-selected example; moreover, the analysis focuses only on one risk measure. However, Vaughn [5] performed a similar analysis on a realistic multi-line insurance data set, with a large number of both policyholder and shareholder based allocation rules. In that analysis, the insolvency-based allocation rules consistently allocated a much higher percentage of risk (and premium) to the highly-skew, or cat-prone, lines than the shareholder allocation rules.

As demonstrated, the choice between a policyholder and a shareholder based risk measure can make a very significant difference in the actual line pricing. In the actuarial literature, there is currently very little guidance given regarding the selection between the two different viewpoints. Venter, Major and Kreps [3] do discuss the issue in the context of the XTVaR risk measure, and offer the following comments:

One possibility for establishing a cutoff probability for tail risk measures would be to use the probability of having any loss of capital at all. Then XTVaR would be the average loss of capital when there is a loss of capital. Another possible choice is the probability that capital is exhausted. The former is arguably more relevant to capital allocation, in that it charges for any use of capital rather than focusing on the shortfalls upon its depletion....

On the other hand, policyholders tend to be sensitive to impairment or default. Studies suggest that they demand premium reductions one or two orders of magnitude greater than the expected value of the default cost in order to accept less than certain recovery. This is in part due to undiversified purchases of insurance. Thus the value of default has meaningful pricing effects, and policyholder concerns become quite relevant to shareholders as well.

In other words, Venter/Major/Kreps contend that a valid case could be made for either an insolvency-based or a capital consumption cutoff point. Yet, given the large difference in resulting premiums, it would be desirable to have a firmer theoretical basis for this decision. This will be discussed more in later sections, in the context of current financial economic theory.

**Variance-Based Risk Measures— Something In Between**

Before we move on to pricing techniques that do not require an actual allocation of capital, let’s consider the following risk measure for the capital allocation:  $p(Y)=Var(Y)$ . A natural, and additive, allocation rule corresponding to this risk measure is the following:  $r(X_i)=Cov(X_i,Y)$ . For our simple example, the resulting risk allocation is as follows:

$$P(Y) = Var(Y) = 0.500 \times (\$90 - \$111.45)^2 + 0.495 \times (\$130 - \$111.45)^2 + 0.005 \times (\$420 - \$111.45)^2 = 876.4$$

$$r(X_{apd}) = Cov(X_{apd},Y) = 0.500 \times [(\$80 - \$100) \times (\$90 - \$111.45)] + 0.495 \times [(\$120 - \$100) \times (\$130 - \$111.45)] + 0.005 \times [(\$120 - \$100) \times (\$420 - \$111.45)] = 429$$

$$r(X_{cat}) = Cov(X_{cat},Y) = 0.500 \times [(\$10 - \$11.45) \times (\$90 - \$111.45)] + 0.495 \times [(\$10 - \$11.45) \times (\$130 - \$111.45)] + 0.005 \times [(\$300 - \$11.45) \times (\$420 - \$111.45)] = 447.4$$

This results in a surplus allocation of \$73.43 to APD and \$76.57 to Cat – which is actually very close to a fifty-fifty split. The resulting premiums are \$98.74 for APD and \$14.55 for Cat, as demonstrated in the following table.

	APD	Cat
(1) Premium	\$98.74	\$14.55
(2) Allocated Surplus	\$73.43	\$76.57
(3) Assets at Beginning of Year = (1) + (2)	\$172.17	\$91.12
(4) Assets at Year-End = (3) x 1.05	\$180.78	\$95.68
(5) Expected Loss at Year-End	\$100	\$11.45
(6) Expected Surplus at Year-End = (4) - (5)	\$80.78	\$84.23
(7) Expected Return on Surplus = (6) / (2) – 1.0	10%	10%

Note that the premiums in this example fall in between the two XTVaR solutions from the previous subsection. Also, note that this solution is sometimes referred to as the “CAPM solution”, because of its similarity in *appearance* to the familiar CAPM of financial theory. In general, the variance risk measure should also be considered as a shareholder-based measure. Again, policyholders are only concerned about insolvency; outcomes which create variance below the “insolvency point” are not of concern to the policyholders. On the other hand, actuaries sometimes

assume that shareholders are concerned about the variance of the return variable<sup>6</sup>, which is the implicit perspective of this risk measure.

## **Allocation of Risk Loads**

As opposed to methods which allocate capital to line or segment, other actuarial methods directly allocate the total corporate *risk load*, thereby eliminating the need for a capital allocation to line. The corporate risk load is defined as total corporate premium minus the discounted (at the risk-free rate) expected value of aggregate losses. This total corporate risk load can still be determined via a corporate “goal” such as target ROE. For example, it was demonstrated in the previous section that a total corporate premium of \$113.29 corresponded to an expected corporate ROE of 10%. For each of the three examples, this total corporate premium was spread differently between the two lines (depending on the selected risk measure and the allocation of capital to line), but the total corporate premium remained unchanged.

Hence, in our simplified example from the previous section, the total corporate risk load that corresponds to a 10% ROE goal is calculated as follows:

$$\text{Risk Load} = \text{Premium} - \text{Discounted (at risk-free rate) Expected Loss} = \$113.29 - \$111.45 / 1.05 = \$7.15.$$

Each of the three allocation methods discussed in the previous section can be used to directly allocate this *risk load*, instead of an allocation of *capital*. As an example, when we discussed XTVaR with an insolvency-based cutoff point ( $b = \$276.45$ ), the total risk measure  $p(Y)$  was allocated 6.5% to APD and 93.5% to Cat. Allocating the risk load (as opposed to the capital) in proportion to this risk measure results in a risk load of  $\$7.15 \times 6.5\% = \$0.46$  for APD and  $\$7.15 \times 93.5\% = \$6.69$  for Cat. The premiums are then determined by adding the risk load to the discounted expected loss amount for each line, as follows:

$$\text{APD Premium} = \$100/1.05 + \$0.46 = \$95.70$$

$$\text{Cat Premium} = \$11.45/1.05 + \$6.69 = \$17.59$$

As shown, the resulting premiums are identical to the surplus allocation example that relied on XTVaR with an insolvency-based cutoff point. This equivalency can also be verified for both the XTVaR with a capital consumption cutoff and the variance approach. Here, the difference is more in terminology than in substance.

## **The RMK Approach**

A recent development in allocation pricing is the so-called RMK approach. As in the previous section, the RMK approach can be used to allocate overall corporate risk loads to line of business, without requiring a surplus allocation. However, the method still requires a “risk measure”, which

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<sup>6</sup> See the discussion of RMK methods below.

accomplishes a similar role as the  $p(Y)$  measure from our previous section. And, once again, we must first ask ourselves if this risk measure should be guided by the risk preferences of the policyholders or the shareholders, as these two constituencies can have a very different viewpoint toward risk.

In general, RMK literature appears to emphasize a shareholder interpretation of this risk measure. For instance, Clark [6] states that “from a stockholders perspective, the risk that matters most is the risk that losses will eat into the capital invested in the company (i.e. that capital will be ‘consumed’).” He then goes on to provide an example of the RMK approach with a “capital consumption” risk measure (see Exhibit 3a in the Clark paper). This would be comparable to the approach used in our XTVaR with a capital consumption cutoff in the section above.

Capital consumption, of course, isn’t the only potential shareholder risk measure. Clark also notes that “stockholders may be interested, for example, in minimizing the variance of the company’s results,” and he provides a numeric illustration (see Exhibit 3b of that paper). This would be comparable to our variance allocation method in the earlier section.

However, while Clark doesn’t explicitly consider it, the RMK approach could also be utilized with a policyholder approach to risk preferences. The important thing to note is that the RMK methods also require a certain interpretation of the insurer risk preferences, and these can be viewed from *either* a policyholder or a shareholder perspective.

## **The Financial Theory Solution**

For both the capital allocation and the RMK approach, we need to specify a risk measure. This selected risk measure can have a big impact on the resulting premium, as demonstrated in the simple pricing example. So should we use a risk measure that is based on capital consumption, variance, insolvency risk, or some other quantity? In this section, we look to financial theory for some guidance.

As noted above, actuarial risk load methods generally utilize the following formula for the premium on a given policy:

Premium = Discounted (at risk-free rate) Expected Loss + Total Corporate Risk Load x Allocated Risk Percentage

Moreover, the “Allocated Risk Percentage” in this formula is often determined via a shareholder-based risk measure, such as XTVaR with an expected loss or “capital consumption” cutoff point. There are two real shortcomings with the actuarial literature here. First, the actuarial literature tends to focus very heavily on the mechanics for allocating various risk measures, while offering very little real guidance or theoretical support regarding the selection of the risk measure. Secondly, the actuarial methods are, in effect, combining *two* separate, and often distinct, perspectives on risk – i.e. the shareholder view and the policyholder view – into a *single* risk measure.



On the other hand, financial methods for insurance pricing recognize and attempt to overcome these weaknesses. Importantly, the financial method acknowledges and separately quantifies the two distinct viewpoints. The most common financial formula for the premium on a given policy is as follows<sup>7</sup>:

Premium = Discounted (at risk-adjusted rate) Expected Loss + Total Corporate Frictional Capital Costs x Allocated Capital

Importantly, this formula or method acknowledges and separately quantifies the two distinct viewpoints on risk: the policyholder (or “insolvency”) perspective is reflected in the surplus allocation, whereas the shareholder perspective is reflected in the *risk-adjusted discount rate* for the expected loss. Furthermore, it is critical to note that the shareholder perspective is *different* from both the “capital consumption” and the variance viewpoints discussed in the previous section. These earlier viewpoints assumed that shareholders focus on the variability of the corporate return as a single entity, whereas financial models focus on the covariance of the corporate return in the context of a much broader financial market index. That is, in the financial model, the shareholder perspective on risk accommodates modern financial theories regarding shareholder portfolio diversification.

Strictly speaking, the expected losses for each line should be discounted at a risk-adjusted discount rate. This risk adjustment reflects shareholder risk and is usually based on some financial market model. Determining the proper risk adjustment for the discount rate by line of insurance is a difficult problem. In practice, empirical studies of “underwriting betas” have not demonstrated large differences in systematic risk by line [9]. Many authors following a financial approach also argue on intuitive grounds that no risk adjustment is required in the discount rate; Feldblum [12] explains the rationale as follows: “Underwriting risks are independent of capital market movements; these risks are diversifiable and do not warrant additional returns.” For these reasons, in many financial papers on the subject the expected losses are discounted at the risk-free rate (reflecting a “zero-beta” for each line) and we will follow that approach in the financial solution in this paper.

In the financial formula above, the total “frictional costs of capital” play the role of the corporate risk load in the actuarial model. Since the primary purpose of this paper is to focus on the *allocation* issues in pricing insurance, let’s calibrate this frictional cost percentage in order to match the corporate risk load (shown, in an earlier section, to be equal to \$7.15) in our earlier example. The frictional cost percentage that accomplishes this calibration is determined by calculating the ratio of the corporate risk load to the total surplus:  $\$7.15 / \$150 = 4.77\%$ .

The key point of this section is that in the economic/financial model, the *policyholder* or “insolvency” viewpoint determines the allocation of capital. Zanjani [10] summarizes as follows:

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<sup>7</sup> For a detailed presentation of this formula, see Myers/Cohn [7] and Myers/Read [8].

"The important point is that, in general, the appropriate capital allocation rule is driven by *consumer* attitudes toward risk. In principle, the rule could be affected by any aspect of the distribution of *defaulted* claims..." Zanjani then provides several examples of policyholder-based capital allocation rules. For consistency with the earlier section, let's use XTVaR with an insolvency-based cutoff point for our capital allocation. As shown earlier, this results in the following allocation of capital by line: APD = \$9.75, Cat = \$140.25. The financial formula then results in the following premiums by line:

$$\text{APD} = \$100 / 1.05 + 4.77\% \times \$9.75 = \$95.70$$

$$\text{Cat} = \$11.45 / 1.05 + 4.77\% \times \$140.25 = \$17.59$$

These are identical to the premiums determined earlier using the actuarial methods with XTVaR and an insolvency-based cutoff point.

## **Conclusions and Opinions**

Granted, this is an oversimplified, and somewhat exaggerated pricing example. However, the example serves to illustrate a common pricing tradeoff between highly skew, cat-prone lines of business and lines with ordinary volatility but no cat risk. The following comments represent the author's conclusions and opinions regarding the current state of allocation methods in actuarial science.

Actuarial methods – both capital allocation methods and RMK approaches – typically utilize a single risk measure (e.g. the  $p(Y)$  function of capital allocation or the  $L(x)$  function of RMK). This forces the actuary to *choose* between a policyholder-based risk measure (such as XTVaR with a high cutoff point) and a shareholder risk measure (such as capital consumption). On the other hand, the financial method offers an approach and framework that allows the actuary to incorporate both viewpoints – as opposed to forcing a choice between them.

For actuarial methods that utilize a shareholder risk measure, there is no good way to incorporate the impact of individual shareholder diversification, since the risk measure is a function of the aggregate loss variable,  $Y$ , alone.<sup>8</sup>

Actuarial methods typically focus much more on the mathematics underlying the allocation than the theory and rationale for it. In fact, many actuarial papers have abandoned theory altogether, and require a completely subjective input for "corporate risk preferences". But abandoning the search for a theoretically-sound solution that is based on the principles of shareholder value maximization leaves each company searching aimlessly after its own personal *ignis fatuus*. Actuaries can, and should, do better.

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<sup>8</sup> In order to reflect systematic risk, the total risk measure would need to be a function of both  $Y$  and the systematic risk, or "beta" of  $Y$ . Some have suggested that a reasonable solution to this "systematic risk" problem is to define  $Y$  as net income – using the "market portfolio" as the assumed asset allocation for the company – instead of aggregate losses. However, there are many conceptual problems associated with this change – as discussed in [11].

In contrast, financial methods are grounded in theory, and reflect the important insights of economics and finance. Financial methods start from “first principles” of economics, under various assumptions about insurance, and then proceed to a pricing solution. It is important to note that many actuaries and others have criticized the specific assumptions underlying the financial methods. Even so, the main messages should not be ignored, which are as follows: (a) the expected losses should be discounted at a risk-adjusted discount rate which incorporates the central theme of individual investor diversification, and the covariance of the insurance losses with the broader stock index;<sup>9</sup> and (b) to the extent that insurance consumers are concerned about solvency risks, then any remaining frictional costs (or “risk loads”, in actuarial terminology) should be allocated in accordance with a policyholder risk measure.

Actuarial capital allocation methods that use a policyholder-based risk measure will generally provide a good approximation to financial pricing methods, provided that the systematic risk component of the loss variables is close to zero.

Actuarial methods – either capital allocation or RMK – that utilize a capital consumption (or other ‘shareholder based’) approach will undercharge cat lines. Lines with ordinary volatility, but no significant skewness or insolvency exposure, will be overcharged.

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<sup>9</sup> As noted earlier, most financial models generally utilize a risk-free discount rate. Feldblum [12] explains as follows: “Underwriting risks are independent of capital markets movements; these risks are diversifiable and do not warrant additional returns.”

**REPORT OF THE  
2008 CAS QUINQUENNIAL MEMBERSHIP SURVEY  
TASK FORCE**



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## **EXECUTIVE SUMMARY**

In this Executive Summary, we present the recommendations of the Quinquennial Membership Survey Task Force to the Board of Directors of the Casualty Actuarial Society (CAS). Based on our detailed analysis of the 2008 Membership Survey results, we developed recommendations in the following major areas:

- Enhanced communications
- Practical applications of CAS research
- Continuing education (CE)
- Professionalism
- Regional affiliates
- International role
- Membership Advisory Panel (MAP)
- Enterprise Risk Management
- Strategic Direction

In the Executive Summary, we also draw your attention to issues raised by Associates and the suggestion to change the timing for the 2013 Quinquennial Survey.

Support for these recommendations can be found in the report.

### **Enhanced Communications**

We recommend that the CAS enhance its communications regarding the:

- International role and goals of the CAS
- Nomination and election process
- Release of issues of the E-Forum
- Sources and uses of CAS revenues
- Role of the CAS as it relates to professional standards
- Opportunities for involvement as well as the benefits of such involvement for retired actuaries

### **Practical Applications of CAS Research**

We recommend that the CAS increase its focus on practical applications particularly in the areas of predictive modeling, stochastic reserving, generalized linear modeling (GLM), and enterprise risk management (ERM). This applies to CAS activities in the following areas:

- Publications and research
- Meetings, seminars, and other CE opportunities

## **Continuing Education (CE)**

We recommend that both the CAS and the regional affiliates seek opportunities to maximize their CE offerings in the most cost-effective method possible. This might include the use of new and emerging technologies for communication. As noted above, we recommend a particular emphasis on teaching practical applications.

## **Professionalism**

We recommend that the CAS develop and maintain a Members Ethics Handbook and that the CAS consider requiring members who are actively participating as actuaries to periodically take part in a course (perhaps web-based) on ethics/professionalism. This Handbook could be similar to those published and maintained by the AICPCU and CFA.

## **Regional Affiliates**

Regional affiliates should strive to increase the availability of their CE offerings in order to provide affordable and convenient education to their memberships.

## **International Role**

Internationally, we recommend that the CAS explore the feasibility of:

- Assisting emerging markets in the development of non-life actuarial disciplines and education
- Working to gain official recognition of the CAS credential in new jurisdictions
- Developing a plan to encourage local practitioners in developing countries to become members of the CAS
- Sending CAS leaders to participate in key meetings in these countries
- Making more CAS exam sites available around the world

We also suggest that the CAS continue its involvement with the International Actuarial Association, and strengthen its communication regarding this involvement. The CAS should consider establishing stronger relations with both the China Actuarial Association and the International Association of Black Actuaries. Finally, the CAS should determine which organizations actually provide non-life actuarial training and should compare the nature of that training to that of the CAS.

## **Member Advisory Panel (MAP)**

We recommend that the MAP Committee incorporate the results of this survey into their recruiting efforts so that the composition of MAP continues to be representative of the CAS membership at large.

## **Enterprise Risk Management**

We recommend that the CAS leadership consider whether it is necessary to conduct a survey focused on ERM, targeted to members who work in ERM, to learn more than could be gathered through the 2008 survey.

## **Strategic Direction**

We believe that the CAS should continue to focus on the competencies that support the traditional actuarial roles of ratemaking and reserving, such as predictive modeling and stochastic reserves, as these were ranked highest by actuaries as important areas for CAS' efforts and strategies. Furthermore, there is a perceived need by the membership that the CAS address these to a greater extent in practical, not only theoretical, ways.

## **Associate Issues**

While we do not offer a specific recommendation on Associate issues, we do believe that it is important to point out to the Board of Directors that there continues to be discontent among some Associates with respect to dues, opportunities for involvement, and voting rights. These opinions were expressed most frequently in the comments on the weaknesses of the CAS. Similar opinions were also expressed in the comments to the questions related to alignment of dues and services/benefits.

## **Admissions**

The survey included only two specific questions on admissions issues. This is mainly due to the fact that the CAS had recently undertaken a major effort to gather feedback on proposed revisions to the basic education system, which led to major changes to the system. Despite the few admissions questions, there were a significant number of free form comments on the admissions process. As always, the comments were split fairly evenly as to whether the basic education system is a strength or a weakness. The Task Force will make the free form comments available to interested parties.

## **Timing of 2013 Survey**

We recommend that the next survey task force avoid duplicating the timing of the 2008 survey when it develops the work plan for the 2013 survey. A fall release date for the survey necessitates analysis of the results during the December to February time period, which tends to be one of the busiest times of year for many actuaries. Conflicts with work responsibilities can lead to delays as well as the inability to devote the time necessary for proper analysis and development of recommendations.



## **INTRODUCTION**

Every five years, the Casualty Actuarial Society (CAS) conducts a major survey of its members. The results of these membership surveys provide CAS leadership with valuable input that helps shape the short- and long-term direction of the organization.

### **Membership Survey Team**

The Quinquennial Membership Survey Task Force (the Task Force) was formed in early 2008 to coordinate the 2008 Membership Survey (2008 Survey). The Task Force was chaired by Nancy Braithwaite and included David Bassi, Jacqueline Friedland, Timothy Graham, Kenneth Leonard, Faith Pipitone, Manalur Sandilya, Alan Seeley, Joanne Spalla, and David Warren. CAS office liaisons Mike Boa and Todd Rogers provided staff support to the Task Force. The CAS hired Association Research Inc. (ARI) to advise the Task Force, administer the 2008 Survey, and cumulate results.

### **Developing the Survey Questionnaire**

To develop questions for the 2008 Survey, the Task Force requested input from the CAS Board, the Executive Council, and all committee chairs. The Task Force elected to repeat a number of questions from prior surveys to enable the observation of trends in both the demographics of CAS members and in their opinions.

In order to maximize the number of questions in the 2008 Survey, while at the same time not making its length excessive, the Task Force continued the process of distributing two different versions of the survey to the CAS membership. This technique, which was based on a recommendation by ARI, was first used for the 2003 Membership Survey (2003 Survey) and the shorter survey forms contributed to the high response rate in 2003. The 2008 Task Force decided to continue this approach so that additional questions could be included. ARI advised that the sample size for each version would be adequate given the size of the CAS membership and the CAS' high historical response rates. Accordingly, we prepared two versions of the 2008 Survey. Survey A contained 60 questions and Survey B contained 62 questions. Thirty-three of the questions, including the 18 demographic items, were included in both versions of the 2008 Survey. Other areas addressed in both versions included: member satisfaction, retirement, publications, and strategic direction.

### **Survey Administration**

The 2008 Survey was conducted online during September and October of 2008. Paper copies were provided only to members without an e-mail address on file or upon request.

## Survey Response Rate

The response rate was 50%, with 2,399 members completing the survey. The table below summarizes the response rates from the past five surveys.

Survey Year	Response Rate
2008	50%
2003	52%
1998	32%
1993	41%
1987	62%

The demographic profiles of the respondents to the two survey questionnaires were virtually identical. We believe that the feedback from the respondent population is representative of the entire CAS membership.

## Survey Analysis

The survey generated 144 pages of free form comments. The Task Force is indebted to CAS member Houston Cheng, who assisted the Task Force in analyzing the comments regarding membership satisfaction, preparing all final charts, and conducting a technical review of this report. Because of the large volume of comments, Mr. Cheng used a word mapping software to assist in the analysis of the respondents' feedback for membership satisfaction. The output of this software was provided to the Task Force for review.

## 2008 Survey Report to the CAS Board of Directors

As you read through this summary report it is important to note that recommendations from each section appear only at the beginning of the section. The support for recommendations and other findings relevant to the section follow. The recommendations are not repeated within the section.

We use a combination of text, tables, bar charts, and pie charts to present the results. When referring to specific response options from the 2008 Survey we use italics text. For all bar charts, we switched the numeric ordering of results from the original survey. In the original survey, 1 was associated with responses of *strongly agree*, *frequently*, and *high priority*; and 5 was associated with responses of *strongly disagree*, *infrequently*, and *low priority*. In all of the bar charts where we present weighted averages of the responses, we switched the order so that 5 is the most favorable response and 1 the least favorable.

## DEMOGRAPHICS

### Gender

	<b>2008</b>	<b>2003</b>	<b>1998</b>
Male	71%	72%	78%
Female	29%	26%	22%
No Response	0%	2%	N/A

The current CAS membership is comprised of 73% males and 27% females.

### Designation

	<b>2008</b>	<b>2003</b>	<b>1998</b>
Fellows	68%	68%	64%
Associates	31%	31%	36%
Affiliates	1%	1%	N/A

The average Associate who responded had been an ACAS for nine years (eight years in 2003). The average Fellow who responded had been an FCAS for eleven years (nine in 2003).

### Age

The youngest respondent to the 2008 Survey was born in 1987 (21 years old); the oldest was born in 1917 (91 years old). The average age of the responding Associates was 41 years, while the average age of the responding Fellows was 43 years.

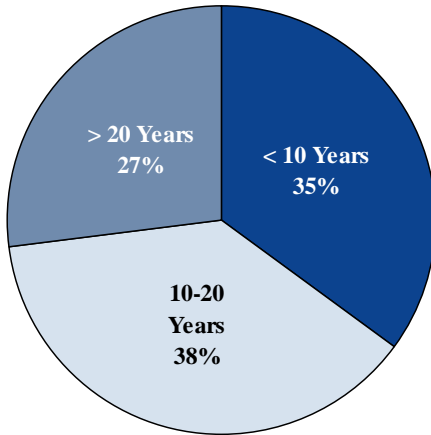
## Years of Experience in the Property and Casualty (P&C) Actuarial Field

The 2008 Survey asked for the first time how many years of experience each member had in the P&C actuarial field.

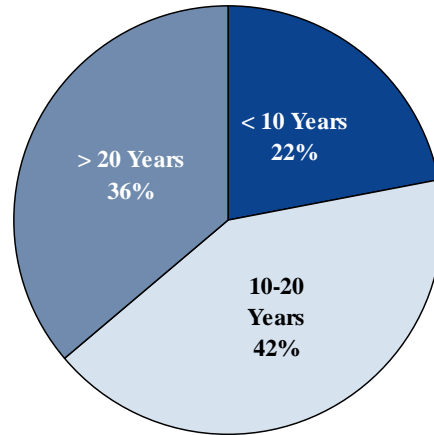
Number of Years in P&C Actuarial Field	% Respondents
Less than 10	26%
10 – 20	41%
More than 20	33%

As expected, there were differences in the number of years' experience between Associates and Fellows.

ACAS - Years of Experience in the P&C Actuarial Field



FCAS - Years of Experience in the P&C Actuarial Field



## New Demographic Questions

The 2008 Survey asked the following three questions for the first time.

### Employment Status

Full-time	90%
Part-time	5%
Retired	4%
Not Currently Employed	1%

We asked respondents whether or not they were currently employed as an actuary; 89% of respondents replied *yes*.

Physical Location of Primary Work Place

United States	87%
Canada	7%
Other	6%

The distribution of respondents is reflective of the CAS membership at large.

Size of Organization with which You are Employed

	Total Employees	CAS Credentialed Actuaries
Less than 50	13%	66%
51 – 200	10%	28%
More than 200	77%	6%

**Business Affiliation**

	2008	2003	1998	1993
Insurance company	54%	55%	57%	58%
Consulting firm	18%	16%	18%	21%
Reinsurance company	9%	14%	13%	9%
(Re)Insurance broker	4%	2%	2%	N/A
Insurance and reinsurance company	3%	N/A	N/A	N/A
Retired	3%	3%	2%	N/A
Service organization	3%	2%	4%	6%
Regulatory organization	2%	3%	2%	N/A
Other	2%	5%	2%	6%
Other financial institution	1%	N/A	N/A	N/A
Rating agency	1%	N/A	N/A	N/A
Academic	0.3%	0.3%	0%	N/A

There was very little difference in the average age within the major types of organizations. The average age of insurance company actuaries was 40 years old; the average age of reinsurance company actuaries was 42 years old; and the average age of consulting actuaries was 43 years old.

## Geographic Area of Primary Business Responsibility

The table below summarizes the results for current responsibilities and compares responses in 2008 to prior surveys. In this question, respondents were requested to check all areas that apply.

	2008	2003	1998	1993
United States	89%	83%	84%	80%
Canada	15%	10%	10%	14%
Europe	13%	7%	5%	7%
— Eastern	3%			
— Western	12%			
Bermuda	10%	5%	N/A	N/A
Asia	7%	4%	5%	4%
— China	3%			
— India	2%			
— Japan	3%			
— Singapore	3%			
— Other	4%			
Mexico	3%	0.1%		
Caribbean	5%	N/A	N/A	N/A
Central America & South America	4%	3%	2%	2%
Australia & New Zealand	4%	1%	Incl. in Asia	Incl. in Asia
Africa	1%	0.4%	Incl. in Asia	Incl. in Asia
Middle East	1%	N/A	N/A	N/A

The 2008 Survey separated Asia into major countries for the first time. Responsibilities in Asia have clearly increased as have responsibilities in Europe. Twenty-seven percent of respondents indicated that they currently have or have had in the past significant worldwide business responsibilities.

## Primary Place of Work

Eighty-seven percent of respondents indicated that the U.S. was their primary place of work; 7% reported Canada and 2% Bermuda as their primary places of work. Seventy-six percent of actuaries working primarily in the U.S. are located in ten states. The following table summarizes these ten states and the proportion of actuaries by region.

<b>Actuaries Working Primarily in the U.S.</b>						
<b>State</b>	<b>2008</b>	<b>2003</b>	<b>1998</b>	<b>Region</b>	<b>2008</b>	<b>2003</b>
Illinois	13%	13%	12%	Northeast	48%	44%
Connecticut	12%	11%	9%	South	12%	15%
New York	11%	10%	12%	North Central	31%	30%
New Jersey	9%	9%	6%	West	10%	12%
California	7%	8%	10%			
Pennsylvania	6%	7%	7%			
Massachusetts	6%	4%	Not available			
Ohio	4%	3%	4%			
Wisconsin	4%	4%	3%			
Minnesota	4%	3%	4%			

### Other Actuarial Organizations

	<b>2008</b>	<b>2003</b>	<b>1998</b>
American Academy of Actuaries (AAA)	72%	80%	82%
AAA Membership as a Percent of those Reporting US as Primary Place of Work	86%	87%	N/A
Canadian Institute of Actuaries	6%	7%	8%
ASTIN	5%	5%	13%
AFIR	2%	2%	8%
Society of Actuaries	4%	4%	5%

We noticed a considerable decrease from 2003 to 2008 in the percentage of CAS members who are also members of the Academy. As a result of this observation, we examined the percent of Academy members as a percent of actuaries whose primary place of work is in the US. An increase in members practicing outside the US explained the decline.

### Professional Designations

	<b>2008</b>	<b>2003</b>
Associate in Reinsurance (ARe)	2%	2%
Associate in Risk Management (ARM)	2%	2%
Associate in Investment Management and Research (AIMR)	0%	0%
Chartered Financial Analyst (CFA)	1%	1%
Certified Public Accountant (CPA) / Chartered Accountant (CIA)	0%	0%
Chartered Property Casualty Underwriter (CPCU)	5%	4%
Chartered Enterprise Risk Analyst (CERA)	0%	N/A
Other (Note: there was no concentration of specific designations)	3%	3%

It is important to note that the CERA designation was still quite new as of the timing of the 2008 Survey, which was released in September 2008. The deadline to apply for a CERA designation based on experience was December 31, 2008. Thus, there may be more CAS members who currently have (or will have in the near future) the CERA designation than indicated by the survey results.

## Education

	2008	2003
BA/BS	71%	74%
MA/MS	20%	18%
MBA	4%	4%
PhD	4%	3%
Other	1%	1%
JD	0%	0%

Twenty-seven percent of the BA/BS and MA/MS degrees were earned from colleges and universities with an actuarial science program.

## Areas of Practice

The second column of the table below (labeled “Career”) represents the percentage of respondents that have worked in the specific area of practice during the course of their career. In the remaining columns of the table, we compare the time spent in the past two years as reported in the 2008 Survey to prior membership surveys.

Area of Practice	Career	Survey Year				
		2008	2003	1998	1993	1987
Pricing / Ratemaking	94%	27%	29%	23%	24%	21%
Reserving	78%	23%	21%	19%	23%	20%
<b>Subtotal Ratemaking and Reserving</b>		<b>50%</b>	<b>50%</b>	<b>42%</b>	<b>47%</b>	<b>41%</b>
Management of Actuarial Unit	61%	11%	11%	13%	12%	12%
Planning – Strategic and Financial	47%	4%	5%	7%	4%	7%
Product Development	46%	3%				
Predictive Modeling	32%	5%				
Programming/Software Development	27%	2%	3%	4%	3%	
Underwriting/Marketing	25%	3%	5%	7%	4%	4%
Executive Management	22%	4%	5%	7%	9%	
Risk & Capital Management (e.g., DFA)	22%	3%	3%	3%		
Data Management	22%	3%	3%	6%	4%	
Regulation	19%	3%	2%			
Teaching/Research	19%	2%	2%	4%	3%	
Enterprise Risk Management	17%	2%				
Expert Witness	16%	1%	1%			
Valuation	14%	1%	1%	1%	2%	
Investments	4%	1%	1%	1%		6%
Other	7%	5%	11%	6%	13%	26%



We note that the percentages of members in executive management and in strategic and financial planning continue to decrease. While the 2008 Survey results show a decrease from the prior two surveys, we also note that more than 20% of respondents indicate that they have served in executive management positions at some point in their careers. We also recognize that the membership base is larger, with many newer and younger members, than in 2003. Finally, we point out that this question in the 2008 Survey offered more options for how members spend their time than prior surveys, thus the time spent by respondents may be more finely recorded in 2008 than in 2003.

### **CAS Leadership**

Thirty-nine percent of respondents indicated that they have held volunteer leadership positions in the last three years. Considering that 31% of CAS members volunteered for the CAS during 2008, it appears that members who volunteer are more engaged, and therefore were more inclined to complete the 2008 Survey.

## ADMINISTRATION

### Dues and Meeting Fees

Ninety percent of respondents indicated that their employers paid for CAS dues and registration fees for CAS meetings and seminars, and 87% indicated that travel expenses for meetings and seminars were also covered by their employers. These percentages increased slightly from the prior survey. Nine percent of respondents pay for all of their dues personally, and 6% pay for all of their meeting and seminar registration fees. The remainder pays a portion of these fees personally.

We reviewed the responses to determine if there were any differences by demographic groups. The categories with the highest rate of employer-paid fees were actuaries:

- Employed by reinsurance companies, reinsurance brokers, and insurance companies
- Primarily working in Canada
- Employed by organizations with more than 51 actuaries

These findings are consistent with the findings in the 2003 Survey. Not surprisingly, retirees and actuaries not currently employed had the highest percentage of respondents paying all dues themselves. The reimbursement patterns for meeting fees were very similar to dues.

Members were asked if they would pay for dues and meeting fees out of their own pockets. Seventy-two percent (down from 77% in 2003) indicated that they would be willing to pay for dues themselves. The demographic groups with the highest positive response rates (i.e., *yes*) to this question were actuaries with the FCAS designation for ten years or more and actuaries whose primary place of work was outside of the U.S. and Canada. When it came to personally paying for meeting fees, however, only 9% of all respondents expressed a willingness to pay the fees themselves; 55% of respondents indicated *yes but less often*.

### Reimbursement for Volunteer Activities

Members were asked whether they paid for all, some, or none of their CAS volunteer activities. Twenty-one percent paid for all of their volunteer activities, and another 18% paid some of their expenses. These proportions were much higher than those paying their own dues. The pattern of relative reimbursement by type of employer was similar to dues and meeting fees. There is a strong correlation between higher reimbursement and the number of employees or number of credentialed actuaries in the respondent's organization.

Only 9% of respondents indicated that they would pay for all of their CAS volunteer activities on their own, and 31% indicated that they would pay on their own but participate less often.

## **ADMISSIONS**

### **Exam Credit Based on Performance in Accredited Courses in Universities**

The 2008 Survey asked: “Should the CAS award exam credit based on performance in accredited courses in universities?” Twenty-seven percent of respondents said *yes*, 60% said *no*, and 13% had *no opinion*. The demographic groups with the greatest support for university-based exam credit were:

- Affiliate members (44%)
- Actuaries whose primary work place is Canada (40%) and other (i.e., not U.S. or Canada) (34%)

It is not surprising that non-U.S. actuaries were more likely to support this idea as actuarial programs at universities are much more common in other countries, such as Canada, the U.K., and Australia.

### **Expand Cooperation with the SOA by Increasing the Number of Joint Exams**

The support for the initiative to expand cooperation with the SOA by increasing the number of joint exams was quite low. Only 18% of respondents supported this idea. A large percentage (25%) had no opinion on the issue.

### **Other Issues**

Many comments in other sections of the 2008 Survey addressed the topic of admissions. A key complaint observed in the comments regarding membership satisfaction was that the admissions system was changing too often. Other weaknesses of the current system identified by respondents included the lengthy travel time and the relevance of exam topics to actuarial functioning. In contrast, some members wrote of a fear that there was a dilution of standards in order to reduce travel time.

## **ENTERPRISE RISK MANAGEMENT (ERM)**

### **Recommendation**

We recommend that the CAS leadership consider whether it is necessary to conduct a survey focused on ERM targeted to members who work in ERM to learn more than could be gathered through the 2008 survey.

ERM is a critical area as indicated in the following statement from the CAS Centennial Goal, as adopted by the Board of Directors in March 2007:

CAS members will advance their expertise in pricing, reserving and capital modeling, and leverage their skills in risk analysis to become recognized as experts in the evaluation of enterprise risks, particularly for the property and casualty insurance industry.

In the 2008 Survey, we asked nine questions on the subject of ERM. Note that we did not include all of the questions that were originally suggested on the topic of ERM because we felt that it would be more appropriate to include them in a survey of actuaries who are directly involved in ERM rather than a survey of the membership at-large, and to keep the length of the survey manageable.

### **Involvement with ERM**

We asked members whether or not they were directly involved in the ERM activities of their companies. Nineteen percent of respondents indicated that they were involved and 81% that they were not. In reviewing the demographic responses to discern if there were differences in the rate of involvement by demographic groups, we noted the highest rates of involvement by actuaries:

- Working at brokerage firms (43%)
- Actuaries working primarily outside of the U.S. and Canada (40%)
- Actuaries working at insurance and reinsurance companies<sup>1</sup> (39%)
- Actuaries with worldwide responsibilities (32%)

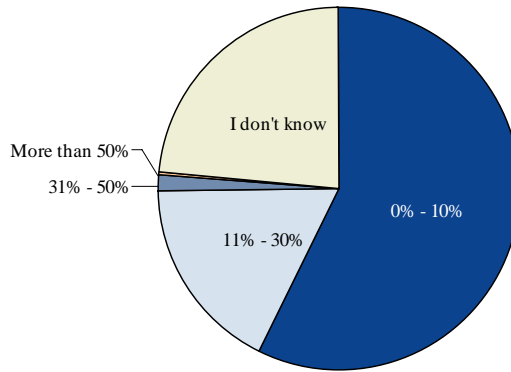
We also asked members to indicate the level of their company's involvement with ERM. For actuaries working at insurance or reinsurance companies, 52% indicated that ERM was either entrenched or very entrenched in their company's operations. For actuaries working in consulting or brokerage firms, 31% indicated that ERM plays a big or very big role in the services that they provide to clients. Finally, we asked members who work at organizations with an ERM function to indicate what role the casualty actuaries play. Sixty-three percent of respondents to this question indicated that casualty actuaries are involved or very involved in the ERM function.

The final question on actuaries' involvement with ERM addressed the amount of time that actuaries spend on ERM. The actuaries with the greatest amount of time spent on ERM were those practicing outside of the U.S. (both Canada and other). Actuaries at brokerage firms also indicated a greater amount of time spent on ERM; 4% of these actuaries spent between 31% and 50% of their time on ERM, as opposed to less than 2% for other organizations. The following chart summarizes the results from this question for all respondents.

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<sup>1</sup> It is important to note that in the various options of employment type that were offered to members, we listed separately: insurance company, reinsurance company, and insurance and reinsurance company. Thus, there may be some distortion in the results of some questions if actuaries did not make the intended distinction between these three options.

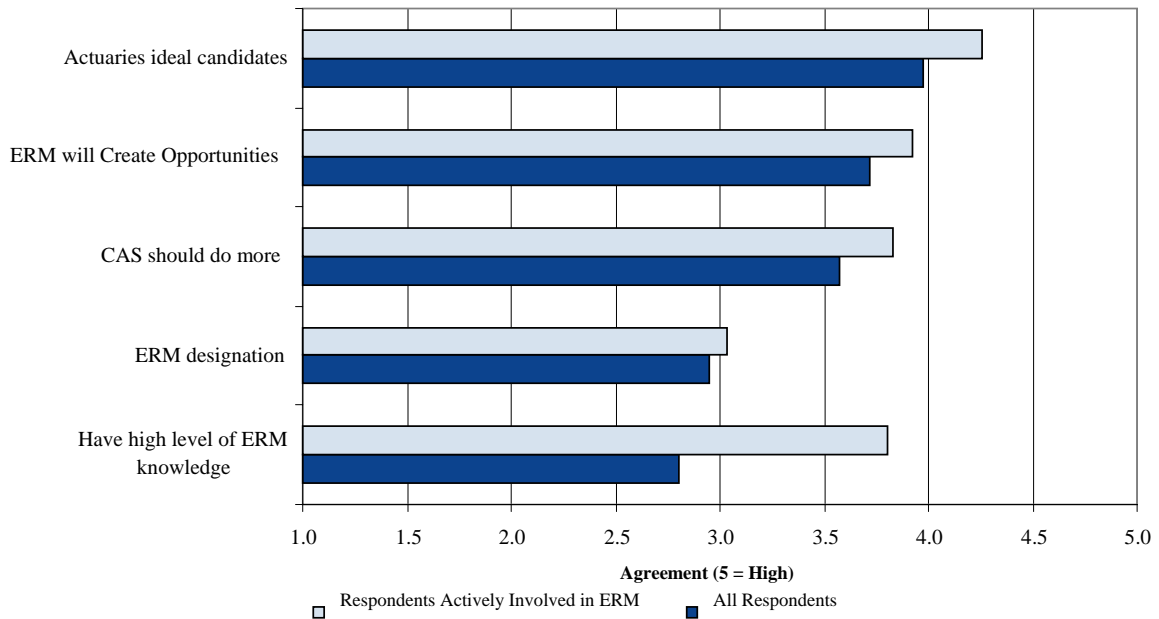
**Amount of Time that Actuaries Spend on ERM**



**Members' Opinions Regarding ERM**

Through several questions, we sought members' input and opinions regarding ERM and the CAS' role in ERM in particular. We first asked members to indicate their level of agreement with five statements. In the following table we present the average responses for all members responding to the 2008 Survey and for the sub-set that indicated that they have a high level of involvement with ERM.

**Members' Opinions Regarding ERM**



It is interesting that both groups (i.e., all respondents and respondents actively involved in ERM) most strongly agree with the statements: *Actuaries are ideal candidates for performing ERM functions* and *ERM will create significant new career opportunities for actuaries*. Both groups were neutral in their

opinions regarding the need for a CAS-sponsored ERM designation. This is valuable feedback for the CAS Task Force that is currently evaluating the global ERM designation.

We also asked members if they thought the CAS should alter its current emphasis on ERM. Only nine percent indicated that there should be a reduction in emphasis on ERM (either *somewhat* or *greatly*). Fifty-four percent of respondents indicated that the CAS should *greatly increase* or *increase somewhat* the emphasis on ERM, and 37% indicated that there should be no change in emphasis.

The demographic groups with the highest proportions indicating increasing the emphasis (either somewhat or greatly) were:

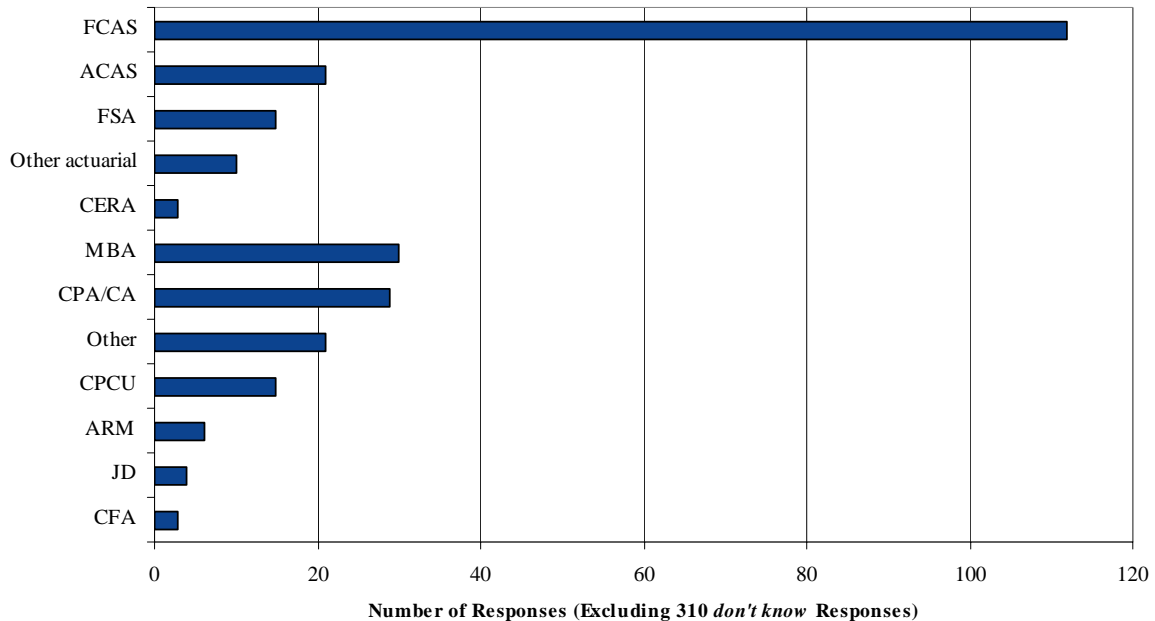
- Actuaries whose primary work place was Canada (69%)
- Female actuaries (61% compared to 51% of males)
- Actuaries at consulting firms (61%)

### Chief Risk Officer

We asked members if their company has a Chief Risk Officer (CRO). Thirty-nine percent of respondents indicated yes, 41% said *no*, and 20% responded *don't know*. Of those who are directly involved with ERM, only 4% of respondents indicated that they did not know if their company had a CRO. Even for those actuaries directly involved in ERM, only 47% of their companies had a CRO.

The next question sought information regarding the CRO's background. Nineteen percent of respondents indicated that the CRO was an actuary, 51% indicated that the CRO was not an actuary, and 30% of respondents did not know. In addition to asking whether or not the CRO was an actuary, we asked for further details regarding the CRO's background. The following table summarizes the responses from this question. Note: the number of responses may not equal the number of Fellows who serve as CROs if multiple respondents answered from the same company.

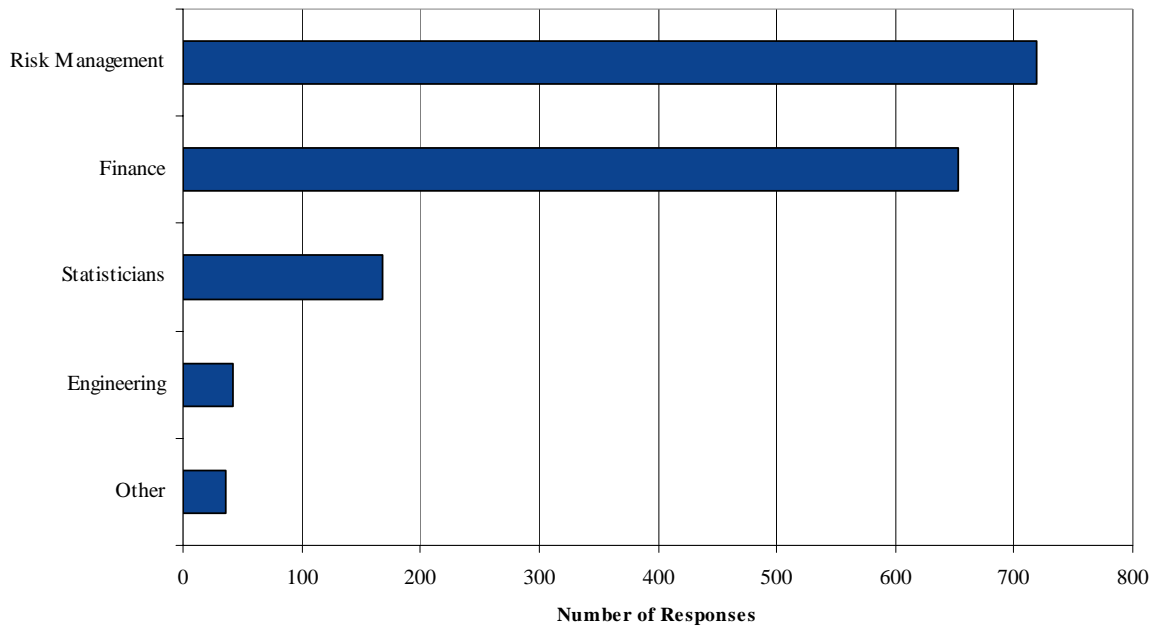
#### Background of CRO



### CAS' Chief Competition in the Field of ERM

The final question related to ERM in the 2008 Survey asked members to identify what professions are the CAS' chief competitors in the field of ERM. Members were allowed to check all the answers that they believed applied and also to provide *other* competitors. The following table summarizes the responses to this question.

**CAS' Chief Competition in the Field of ERM**



## **GOVERNANCE/ELECTIONS**

### **Recommendations**

We recommend that the CAS publish more information about the nomination and election process.

We also recommend that the CAS consider whether or not further investigation regarding Associate voting rights is necessary in light of the comments provided to the 2008 Survey, not only in this section but other sections as well.

### **Election Process**

Forty-four percent of the respondents indicated that they voted in the 2008 elections. This compares to the actual election participation rate of 37%. Consistent with previous observations, it appears that members who completed the 2008 Survey were more likely to be involved both as volunteers and also in the election process. The 44% election participation rate is a significant decrease from the 65% of respondents who indicated that they voted in the 2003 elections. It is important to note that in 2001 and 2002 there were contested elections for the position of president-elect, which tended to increase the rate of voter participation. The 2003 survey questioned members' participation in the 2002 elections.

### **Voting Rights for Associates**

The majority of the respondents (59%) believe that Associates should have voting rights within the CAS. This is down from the 65% of respondents who were supportive of Associate voting rights in the 2003 Survey. Associates were more likely to favour these voting rights than Fellows (83% versus 48%). The percentage of Fellows supporting voting rights is down from the 54% of Fellows who were supportive of Associate voting rights in the 2003 Survey. There was not a significant difference in the findings relative to the number of years since attaining either the ACAS or FCAS designation.

While there is general support for granting voting rights to Associates, there is disagreement over when those rights should begin. For those who believe that Associates should have voting rights, approximately half believe that voting rights should begin upon achievement of the ACAS designation while the other half thinks that a waiting period after achieving the designation is appropriate. The average suggested waiting period is five years.

Approximately 80% of respondents believe that if eligible, Associates should be entitled to stand for election to the Board of Directors and Vice-Presidents on the Executive Council with the exception of Vice President – Admissions.

The issue of ACAS voting rights produced comments not only here, but in a number of other questions with comments. In the Member Satisfaction section, several members commented on the "inequity of Associates with no voting rights paying the same dues as Fellows with voting rights." In the Volunteer section, several people mentioned that "as Associates without a vote, they were not inclined to volunteer." More than two hundred respondents provided comments to this specific question. The comments ranged from strong support to strong opposition, with many others



expressing indifference. Examples of the emotion surrounding the issue include:

- “It is fundamentally un-American ... associates ... pay the same fees as fellows but not allowed to vote”
- “Give me a vote!”
- “Don’t allow it”
- “No means no”
- “Hell no”

### **Nomination and Election Processes**

In the 2008 Survey, we asked if members were satisfied with the process for nominating CAS members as Board of Directors, Vice-Presidents, and President-Elect. The results for all three questions were very similar and are summarized in the following table.

<b>Are you satisfied with the process for nominating CAS members as</b>			
	<b>Yes</b>	<b>No</b>	<b>Unfamiliar with the process</b>
Board of Directors	52%	5%	43%
Vice Presidents	50%	5%	45%
President-Elect	48%	9%	43%

## **INTERNATIONAL**

### **Recommendations**

We recommend that the CAS explore the feasibility of:

- Assisting emerging markets in the development of non-life actuarial disciplines and education
- Working to gain official recognition of the CAS credential in new jurisdictions
- Developing a plan to encourage local practitioners in developing countries to become members of the CAS
- Sending CAS leaders to participate in key meetings in these countries
- Making more CAS exam sites available around the world

We also suggest that the CAS continue its involvement with the International Actuarial Association (IAA), and strengthen its communication to members regarding this involvement. The CAS should consider establishing relations with the China Actuarial Association.

Finally, the CAS should determine which organizations (including those listed by survey respondents) actually provide non-life actuarial training and should compare the nature of that training to that of the CAS.

### **Other Actuarial Societies**

Six percent of respondents (74 members) have attained recognition from actuarial societies other than the CAS, Canadian Institute of Actuaries (CIA), or the Academy. Actuarial societies from which these respondents have attained recognition include the Society of Actuaries (SOA), the Institute of Actuaries (UK), and Ireland's Society of Actuaries. We note that the CAS currently has 18 Fellows by mutual recognition (13 from the Institute of Actuaries U.K. and five from the Institute of Actuaries of Australia).

The demographic groups with the highest response rates for having attained recognition from other actuarial societies include actuaries who:

- Are retired (16%)
- Work in a reinsurance brokerage (15%) or consulting firm (10%), or whose employer type is "other" (10%)
- Work in organizations with less than 50 people (10%)
- Currently or previously had worldwide business responsibilities (9%)
- Are older than 45 (9%) and more experienced (i.e., ten years or more FCAS tenure) (8%)

Twenty-eight percent of the respondents whose primary work place was outside of North America have attained such recognition.

Two percent of respondents were trying to obtain recognition from actuarial societies other than the CAS, CIA, or AAA. Societies mentioned include the SOA and the China Actuarial Association. Actuaries seeking such recognition tend to be members who are:

- Affiliate members
- Primarily work outside of the U.S. (i.e., other and Canada)
- Young (less than 36 years old) and less experienced (less than ten years)
- Work in a brokerage firm

Several respondents listed the China Actuarial Association and the CFA Institute as actuarial organizations with which the CAS should establish relationships. We note that the CFA Institute is not an actuarial organization.

### Quality of Non-Life Actuarial Training: CAS vs. Other Organizations

The following table lists the organizations that survey respondents viewed as competitors to the CAS and displays their opinion of the quality of the non-life actuarial training provided by the organizations. It remains to be determined whether some of the organizations listed actually provide non-life actuarial training.

Organization	Number of Respondents	Superior to CAS	Equal to CAS	Inferior to CAS
Faculty of Actuaries/Institute of Actuaries (UK) (including GIRO)	62	15%	50%	35%
Society of Actuaries	14	0%	29%	71%
Institute of Actuaries of Australia	13	15%	70%	15%
CFA Institute	8	63%	25%	12%
Canadian Institute of Actuaries	5	20%	80%	0%
CPCU Society	5	20%	0%	80%
ASTIN	4	25%	25%	50%
International Actuarial Association	3	0%	33%	67%
Conference of Consulting Actuaries	3	33%	33%	33%
American Academy of Actuaries	3	0%	33%	67%
DAV (German Actuarial Society)	3	0%	33%	67%
CONAC/AMA (Mexican Actuarial Societies)	2	0%	0%	100%
University-based education	2	0%	0%	100%

### Advantages and Limitations of CAS Training over Available Global Alternatives

There were about twenty responses to these two questions. The key advantages noted of CAS training were the depth, scope, practicality, and rigor, as well as its exclusive focus on P&C insurance. Other advantages cited were the proven track record of the CAS and its recognition in many countries.

Limitations noted include a primarily U.S.-focus and the lack of a broader global perspective incorporating the practices of Europe, Asia, and other regions. Some respondents viewed the length of

time required to obtain an FCAS designation as well as an exam program that “encourages one-dimensional candidates with limited business and interpersonal skills” to be limitations of the CAS. Respondents also noted that “examinations tend to concentrate on bookwork rather than applying the underlying principles” in contrast to the “British exams [which] ask fewer but longer questions that test in-depth knowledge better.”

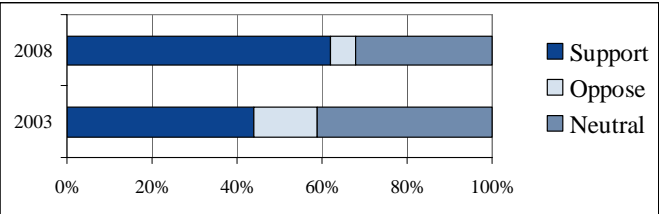
### Proposals to Support the Actuarial Profession in Developing Countries

The survey asked respondents to weigh the merits of eight potential CAS initiatives to support the development of the actuarial profession in countries where the profession is in the developmental stage. The greatest support for these proposals arose from actuaries who:

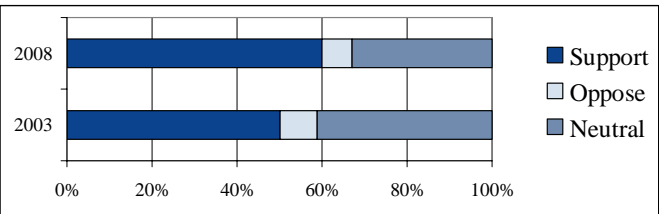
- Primarily worked outside of the U.S. (i.e., other or Canada)
- Female
- Are young as indicated either by age or number of years’ experience
- Worked at a brokerage firm
- Currently or previously had worldwide business responsibilities

The charts below compare the level of support, opposition, and neutrality that each proposal received in the 2008 and 2003 Surveys.

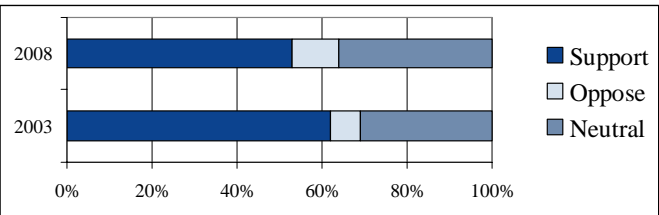
Assist emerging markets in developing non-life actuarial disciplines and education.



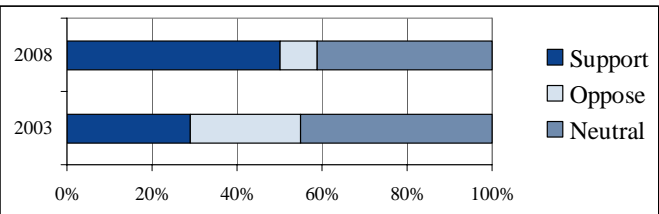
Work to gain official recognition of the CAS credential in various jurisdictions.



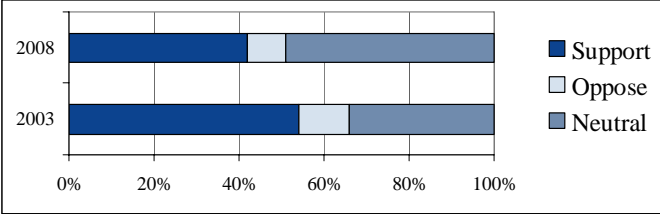
Send CAS leaders to participate in key meetings in these countries.



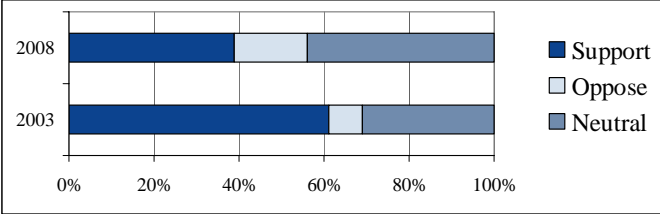
Develop a plan to encourage local practitioners in developing countries to become members of the CAS.



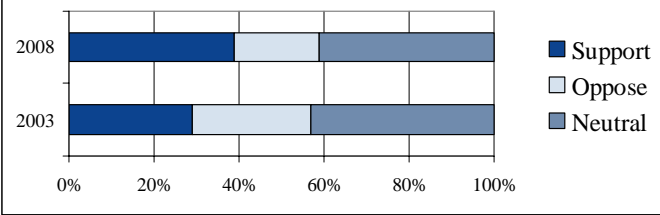
Make more CAS exam sites available around the world.



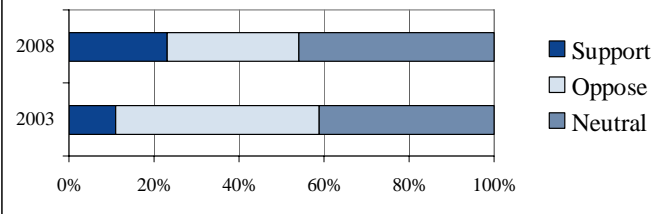
Subsidize CAS member costs to travel and speak at general insurance/actuarial seminars in developing countries.



Subsidize the registration/travel costs for actuaries from developing countries to speak at CAS meetings and seminars.



Subsidize the registration/travel costs for actuaries from developing countries to attend CAS meetings and seminars.



### CAS Involvement with the IAA

In response to the question of what type of relationship the CAS should have with the IAA, 70% of respondents indicated *active participation* (up from 42% in 2003), 18% selected *close alignment*, and 12% preferred that the CAS *act independently* of the IAA. Not surprisingly, the strongest support for close alignment and active participation came from actuaries who work primarily outside of the U.S. There was also very strong support from younger actuaries, as identified both by age (less than 36) and number of years of experience (less than ten years), and from actuaries working at brokerage firms.

Those who felt most strongly that the CAS should act independently were Associates with ten years or more tenure, older actuaries (46 or older), and actuaries working in employment type other or in organizations with less than 50 employees.

## MEMBER ADVISORY PANEL (MAP) RESPONSES

### Recommendation

We recommend that the MAP Committee incorporate the results of this survey into their recruiting efforts so that the composition of MAP continues to be representative of the CAS membership at large.

### Introduction

The MAP was formed in 2004 to provide CAS leaders and committees with access to a representative sub-group of members who were willing to participate in surveys and research conducted by the CAS. There were 118 members of MAP at the time the 2008 Survey was conducted. In our efforts to determine whether the MAP was truly representative of the membership-at large, we included a question on the 2008 Survey which asked respondents if they were a member of the MAP.

### Demographics

The average age of the MAP respondents, 44 years, was similar to the average age of non-MAP respondents, 42 years. The MAP respondents were slightly more experienced, with an average of 20 years working in the actuarial profession, than non-MAP respondents, who had an average of 17 years' experience. ACAS tenure for MAP members was about two years less than the overall average, while the FCAS tenure was about two years more than average.

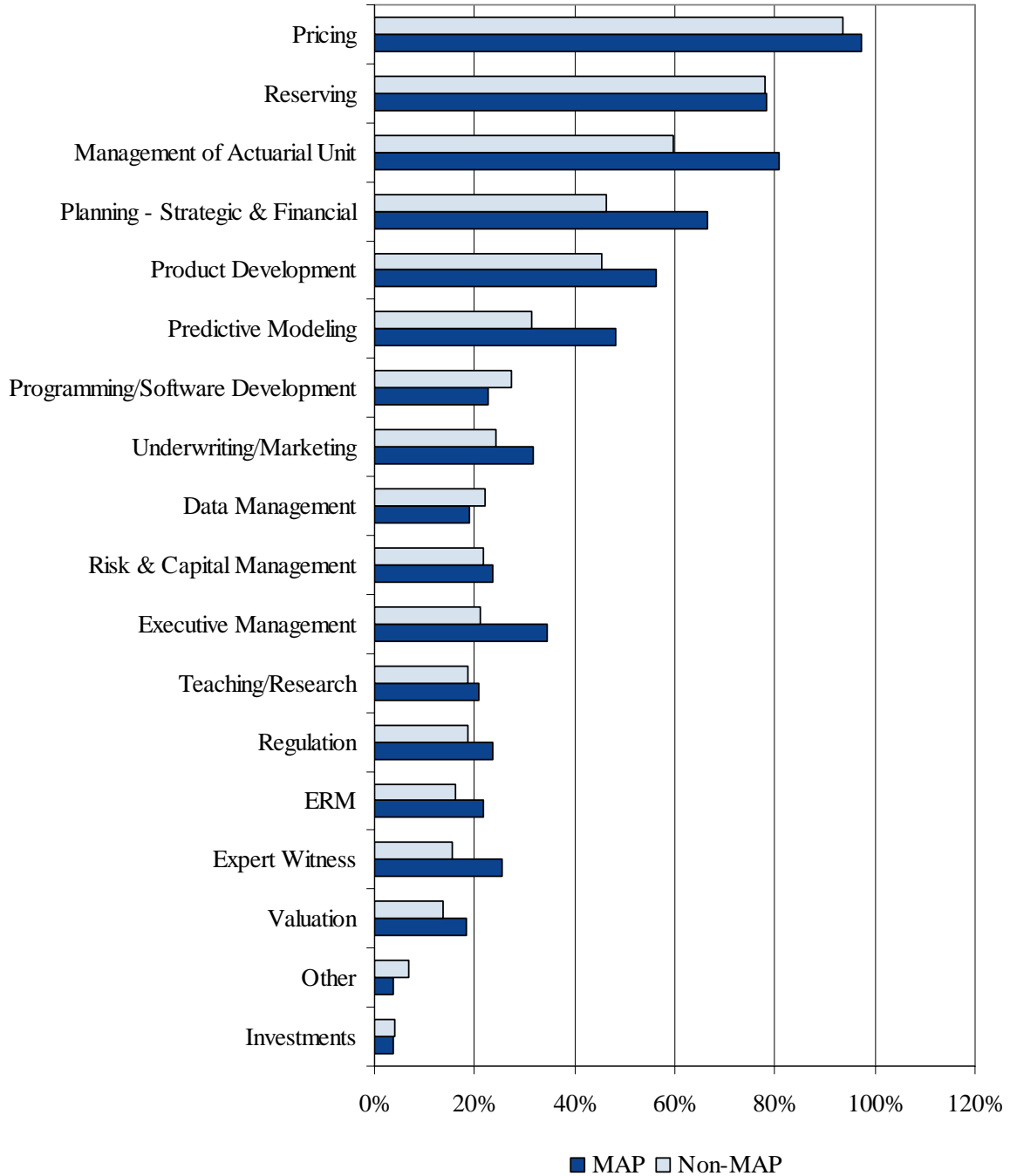
The MAP respondents worked for companies of similar size compared to the overall respondents, although they were slightly under-represented in companies with 51-200 total employees (5% for MAP vs. 10% for non-MAP). They had much higher representation in organizations that had 51-200 actuaries (40% vs. 28%), and quite similar representation in organizations with over 200 actuaries (5% vs. 6%).

Worldwide business responsibilities for MAP respondents over the course of their career were similar to those of non-MAP. MAP respondents have more management experience than non-MAP as summarized in the following table.

	MAP	Non-MAP
Executive management	35%	21%
Management of an actuarial unit	81%	60%
Worked in strategic or financial planning	66%	48%

The following chart compares the roles assumed by the non-MAP respondents and MAP at any time during their careers.

### Roles Assumed at Any Time During Career



## **Satisfaction**

MAP members tend to be slightly more satisfied with the CAS than non-MAP members; although both groups appear to be quite satisfied.

## **Regional Affiliates**

MAP members appear to be disproportionately located in the U.S. Midwest. Twenty-eight percent stated that they were active participants in the Midwest Actuarial Forum as compared to 15% of the non-MAP respondents.

## **Publications**

There is no discernable difference in responses except that MAP members exhibited more interest in writing and submitting papers.

## **Governance**

MAP members are almost twice as likely to vote in the CAS elections (65% of MAP respondents voted for all offices in the last election vs. 35% for non-MAP). MAP members are more satisfied with the CAS nomination process, and a higher percentage of MAP members are familiar with the nomination process.

## **Research**

There were no significant differences in MAP respondents and non-MAP respondents in the area of research.

## **Continuing Education (CE)**

MAP members are more likely to get their CE from CAS seminars (77% vs. 56%).

## **Volunteerism**

MAP members are more likely to volunteer, which is not surprising since service on MAP is a volunteer activity.

## **Enterprise Risk Management (ERM)**

MAP members are more likely to be involved in ERM, but their opinions about ERM differ little from the overall membership.



## **Strategic Direction**

MAP members had similar responses to non-MAP respondents in areas of strategic direction and threats to the actuarial profession. However, 67% of MAP respondents felt that *other* threats were significant compared to just 20% of non-MAP respondents.

## **Conclusion**

Overall, MAP members appear to be a good proxy for the membership at large. There was little difference in the demographics of the MAP and non-MAP respondents. MAP respondents were a bit more experienced and volunteered more frequently in the CAS. We believe that the active participation as volunteers is related to the more favorable scores in satisfaction and governance observed for MAP members. An often-seen outcome of greater involvement with an organization is greater satisfaction. In key areas, such as ERM and strategic direction, there were minimal differences between MAP and non-MAP respondents.

## MEMBER SATISFACTION

### Recommendations

We recommend that the CAS Board of Directors publish, on an annual basis, in a graphical depiction, information summarizing both sources of revenue and uses of revenue.

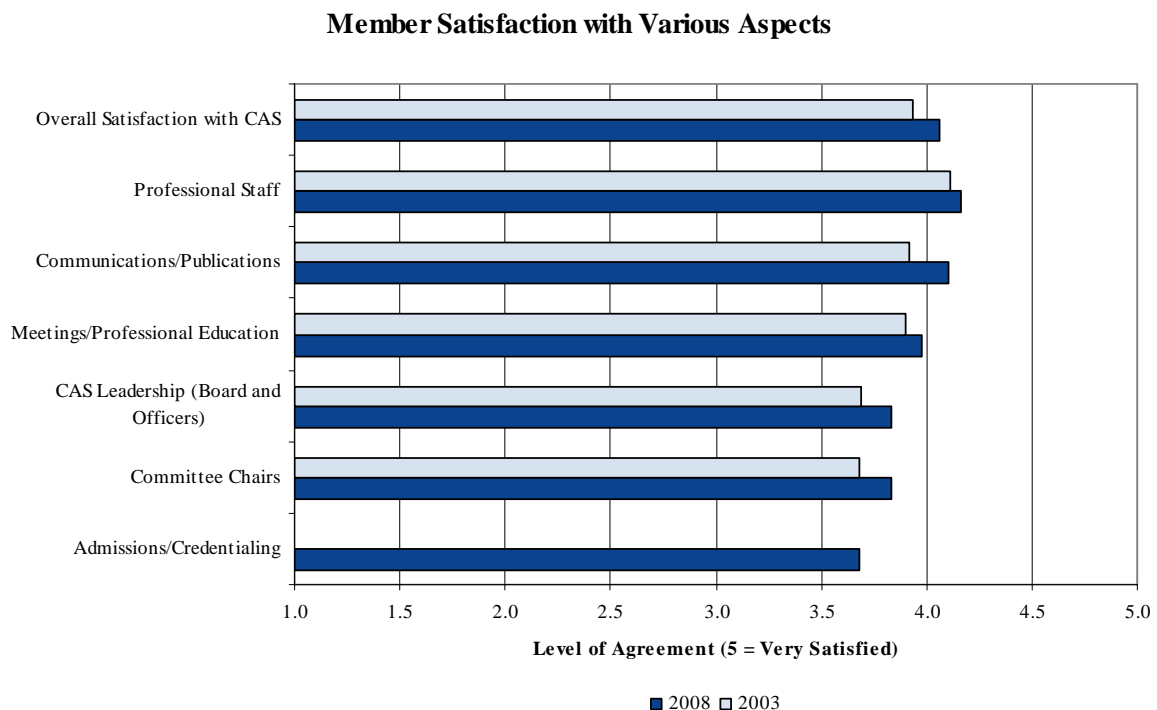
We recommend that the Board of Directors continue to educate members about its international presence and focus.

Due to the very high number of comments related to the education and credentialing process, we recommend that the CAS continue its high level of exhaustive review whenever decisions for change are made.

Finally, we recommend that the CAS seek to improve CE opportunities, particularly those that emphasize practical applications of existing theory and those that use new delivery mechanisms for communication with reduced costs for participants.

### Membership Satisfaction

The 2008 Survey once again asked members to rate their level of satisfaction with specific aspects of the CAS, as well as their overall satisfaction with the CAS.



Overall, satisfaction rates continue to be tremendous with almost 80% of the respondents *somewhat satisfied* or *very satisfied*. CAS staff once again garnered the highest satisfaction ratings, followed by communications/publications and meetings/professional education. Ratings for CAS leadership and

committee chairs were somewhat lower, although still very positive. The results in 2008 are consistent with the findings from 2003 when this question was first asked.

Similar to the findings in 2003, there was a positive correlation in 2008 between the level of involvement in the CAS and satisfaction. The only demographic group to express dissatisfaction with the CAS was those *not currently employed*.

### Rate of Return on CAS Dues

A new survey question for 2008 was how members rate the return on their CAS dues. The table below summarizes the results for this question in total and by designation.

Respondents	Do you consider the return on CAS dues investment to be		
	Greater than Expected	Equal to Expectation	Less than Expected
All	7%	86%	7%
ACAS	4%	87%	9%
FCAS	8%	86%	6%

Almost 130 comments were received to the question: “If you feel that the dues and services/benefits are not in line with each other, what would need to be done to bring them in line?” The most common theme (approximately 10% of respondents) expressed a lack of knowledge about the CAS finances. Several comments noted the extensive use of volunteers and the perception that conferences and exams were self-funding (i.e., supported by the associated fees). This led some respondents to question what the annual dues funded. A number of members also questioned why an Associate, who does not have voting rights, should pay the same dues as a Fellow.

### Strengths and Weaknesses of the CAS

Approximately 1,300 respondents (56%) provided comments on the strengths of the CAS, and 1,100 (46%) provided comments on the weaknesses. (For the 2003 Survey, roughly 700 respondents provided comments about the CAS’ strengths, and 600 provided comments on the weaknesses.) As noted in the Introduction section, we used a word mapping software to assist us in the analysis of this large number of respondents’ comments.

#### Strengths

The most frequently cited strengths of the CAS included:

- Members (472)
- Education (470)
  - Exams (298)
  - CE (172)
- Research and development (119)
- Meetings (75)

In the list above, the values in parentheses refer to the number of respondents citing such strength.

Of the close to 500 respondents who cited membership as a strength of the CAS, 98 respondents specifically cited the volunteerism of CAS members. This is similar to the findings in 2003, when membership and the volunteer culture were cited as the greatest strengths of the CAS. A general message within many of the education and exam comments was acknowledgement that credentialing qualified individuals to become members of the CAS produces a credential that is meaningful. Other recurring themes for strengths of the CAS (though less easy to quantify because of the many different words used to express them) were: professionalism, reputation, and quality of the organization.

### Weaknesses

Similar to the 2003 Survey, the most frequently cited weakness of the CAS was related to education. More than 400 respondents indicated weaknesses in the examinations, credentialing, or syllabus. Specific concerns were: frequent changes in the basic education structure or syllabus, testing memorization rather than understanding, travel time, and outdated material.

While there were innumerable valuable comments, we highlight one which summarizes the opposing views we often noted in many of the strength/weakness responses: "I'd say the weakness is also the strength. The credentialing process, particularly the educational and exam process has the potential of not staying up to date and not adjusting to new business and professional needs."

It is interesting to note that in 2003, the negative comments about exams outweighed positive comments by more than two-to-one. This relationship of negative-to-positive comments has decreased significantly in the 2008 Survey (433 to 298, or 1.45-to-1).

Sixty-nine respondents indicated that they believed CE to be a weakness of the CAS. Many respondents simply provided the comment "continuing education" without any further explanation. Other members specifically commented on CE and its:

- Cost
- Lack of value
- General focus
- Theoretical focus
- Lack of practical focus
- Requirements

The comments directed at the absence of CE opportunities with a practical instead of theoretical focus were similar to findings in other sections of the 2008 Survey, particularly Publications and Research and Development.

While approximately 700 other comments were received regarding weaknesses of the CAS, there were only two issues that were raised by more than 50 respondents: too narrow a focus on North America (57 respondents) and lack of relevance (74 respondents). The issue of a narrow focus on North America was also raised in the comments by members in other sections of the 2008 Survey.

### Recognition of Actuarial Profession

An issue that was raised as both a strength and weakness (by different respondents) in the 2008 and 2003 Surveys was the recognition of the actuarial profession. In 2008, 240 respondents cited this as a strength (79 in 2003); and in 2008, 163 cited this as a weakness (119 in 2003).

### Difference in Tone of Responses 2003 vs. 2008

Overall, there was a notable difference in the tone of the responses when comparing the 2008 and 2003 comments, particularly regarding the weaknesses of the CAS. Many of the 2003 comments were directed internally at the organization itself. There was much more bitterness and anger expressed in many of the 2003 comments. In 2008, the comments were directed to a much greater extent outside of the CAS itself, to the larger business and international communities.

## PROFESSIONAL EDUCATION

### Recommendations

We recommend that the CAS Board of Directors investigate more affordable means for CE. This may include the use of new and emerging technology for communication purposes.

We also recommend that more CE opportunities be available with emphasis on practical applications, particularly for the topics of enterprise risk management, predictive modeling, and GLM.

### Number of CE Hours Earned

Respondents indicated that during the last three years prior to the survey, they spent an average of 16 hours per year in *organized CE activities*. Members were also asked to indicate the total number of hours of *other CE activities* that they had completed within the past three years. *Reading research articles* was an example of *other activities* contained in the 2008 Survey. Taking into account the results of all respondents, the average annual time on *other activities* was 37 hours. In reviewing the detailed respondent results, however, we conclude that some members who had not yet attained Fellowship were including study hours in their responses to this question. The average number of hours for *other activities* for Fellows only (72% of the respondents for this question) was 27 per year.

### Communication of New Qualification Standards

Overall, respondents indicated that the communication regarding the new qualification standards was sufficient. Sixty-nine percent of respondents indicated that the communication was sufficient; 23% did not think the communication was sufficient. However, there were significant differences of opinion between FCAS, ACAS, and Affiliates as demonstrated in the table below.

	Total	FCAS	ACAS	Affiliate
Number of Respondents	1,081	729	343	8
<b>Communication of Revised Standards</b>		<b>Percentage</b>		
Sufficient	69%	74%	59%	50%
Not sufficient	23%	19%	32%	25%
Not applicable	8%	7%	9%	25%

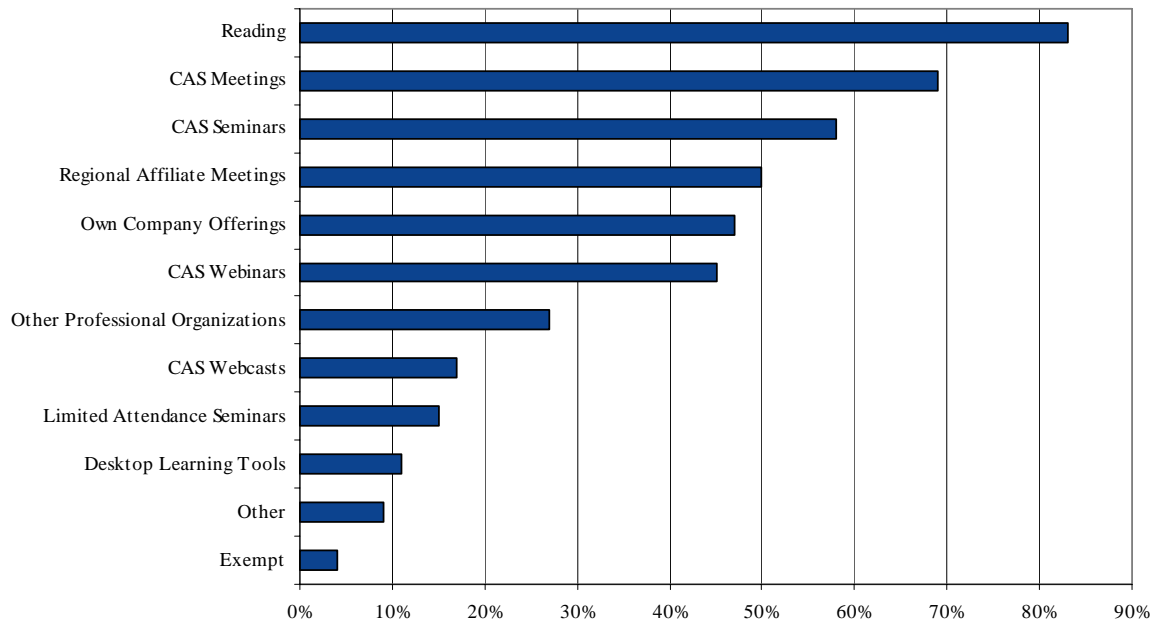
Of the 8% of respondents who reported that the standards were not applicable, the majority fell into three categories:

- Not practicing as actuaries
- New members of the CAS (perhaps Associates studying for exams)
- Not practicing in the U.S.

## Fulfilling Requirements

The respondents were asked to indicate how they would fulfill their CE requirements.

### Method of Fulfilling Continuing Education Requirements



The most frequent responses for *other* (in order of frequency) were:

- Studying for exams
- Committee work
- Industry seminars

## Business Skills

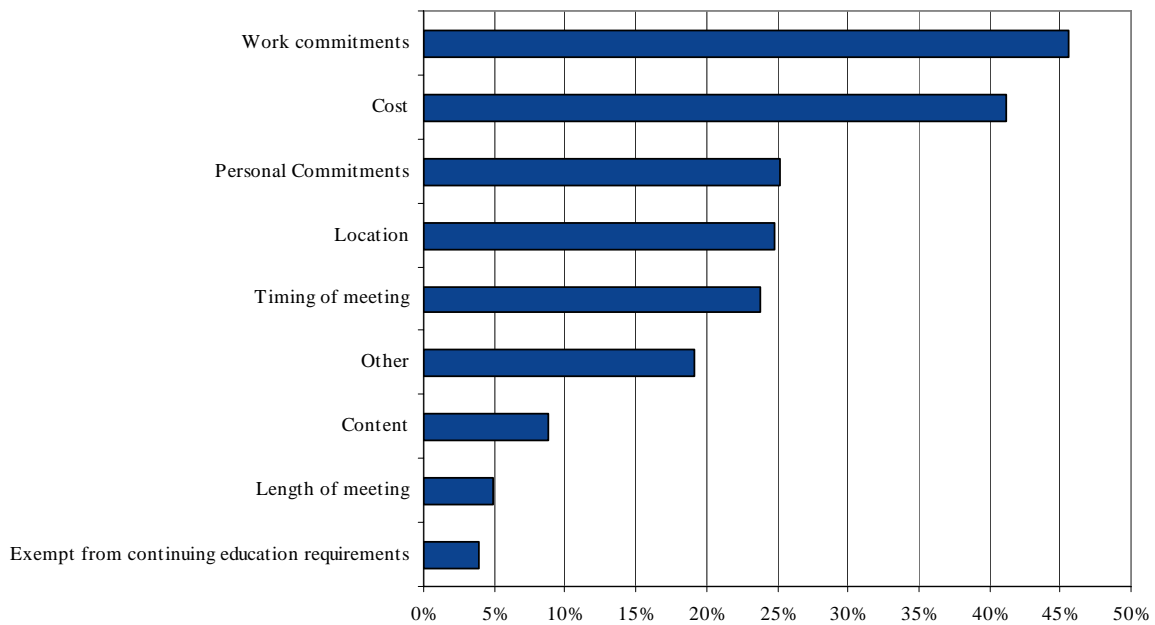
An overwhelming majority of respondents (72%) thought that general business skills education should continue to be offered by the CAS. The most frequently mentioned business skill topics requested were:

- Communication
- Negotiation
- Presentation
- Accounting

## CAS Meeting/Seminar Attendance

We asked members who had not attended a CAS meeting or seminar to indicate the reason(s) for non-attendance. Respondents were able to specify *other* reasons for non-attendance. Over one-third of the respondents providing comments indicated that they did not attend CAS meetings or seminars because they were new members. Approximately 15% of the write-in comments mentioned cost-related issues as a barrier to attending. The following table summarizes the results (excluding write-in comments) to this question.

**Reasons for Not Attending CAS Meetings or Seminars**



We conclude that, in the near future, the state of the current economy may have an influence on attendance at CAS meeting and seminars. This is based on the fact that over 40% of respondents indicated that cost was one reason for not attending CAS meetings and seminars and that a number of respondents indicated (in a prior question) that they would fulfill much of their CE through reading.

Once again, we report on opinions of the respondents that the existing CAS educational focus is too theoretical and not sufficiently practical. In the suggestions for topics to be offered at future meetings and seminars, the most frequent response was for more practical applications of the newer theories and methods. Other popular suggestions included: ERM, predictive modeling, and GLM. It is important to note that members specifically requested practical applications of these three topics.



## PROFESSIONALISM

### Recommendations

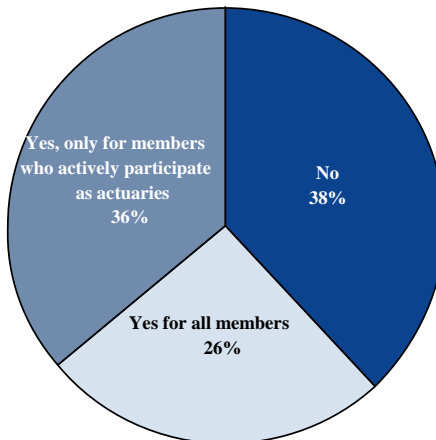
We offer two recommendations to the Board of Directors:

- Develop and maintain a Members Ethics Handbook, similar to those published and maintained by the AICPCU and the CFA.
- Consider requiring members who are actively participating as actuaries to periodically take part in a course (perhaps web-based) on ethics/professionalism.

### Required Attendance at a Course on Professionalism

We asked members whether there should be a requirement to periodically attend a course on ethics/professionalism.

#### Required Attendance at a Course on Professionalism



The strongest opposition to such a requirement came from:

- Actuaries employed by brokerage firms (52%)
- Actuaries practicing in Canada (49%)

The opposition from Canadian actuaries probably arises due to the existing CE requirements of the CIA which include specific time obligations related to professionalism. It was interesting to note the difference in responses between males and females: 41% of men opposed such requirement, while only 30% of women were opposed.

It is not surprising that the demographic groups with the highest response rates for *yes only for members actively participating as actuaries* came from retired actuaries and those not currently employed.

## **Development of a Members Ethics Handbook**

Seventy-one percent of respondents indicated that the CAS should develop and maintain a Members Ethics Handbook. While the responses to this question were fairly consistent over most demographic groups, the strongest support came from:

- Actuaries working in insurance and reinsurance companies<sup>2</sup> (84%)
- Actuaries whose primary work place is Canada (82%)
- Retired actuaries (80%)
- Actuaries working for brokerage firms (78%)
- Actuaries in employment type other (78%)
- Affiliate members (78%)
- Female (76%) (this compares to 69% for male)

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<sup>2</sup> It is important to note that in the various options of employment type that were offered to members, we listed separately: insurance company, reinsurance company, and insurance and reinsurance company. Thus, there may be some distortion in the results of some questions if actuaries did not make the intended distinction between these three options.

## PUBLICATIONS

### Recommendations

We recommend that the CAS increase its focus on papers with practical applications, particularly for ERM, GLM, and predictive modeling. (A similar recommendation arose from the responses to the Research and Professional Education sections of the 2008 Survey.)

We recommend increased promotion of the release of the E-Forum to members. Distributing brief abstracts of papers, for example, could increase the frequency that members access this publication.

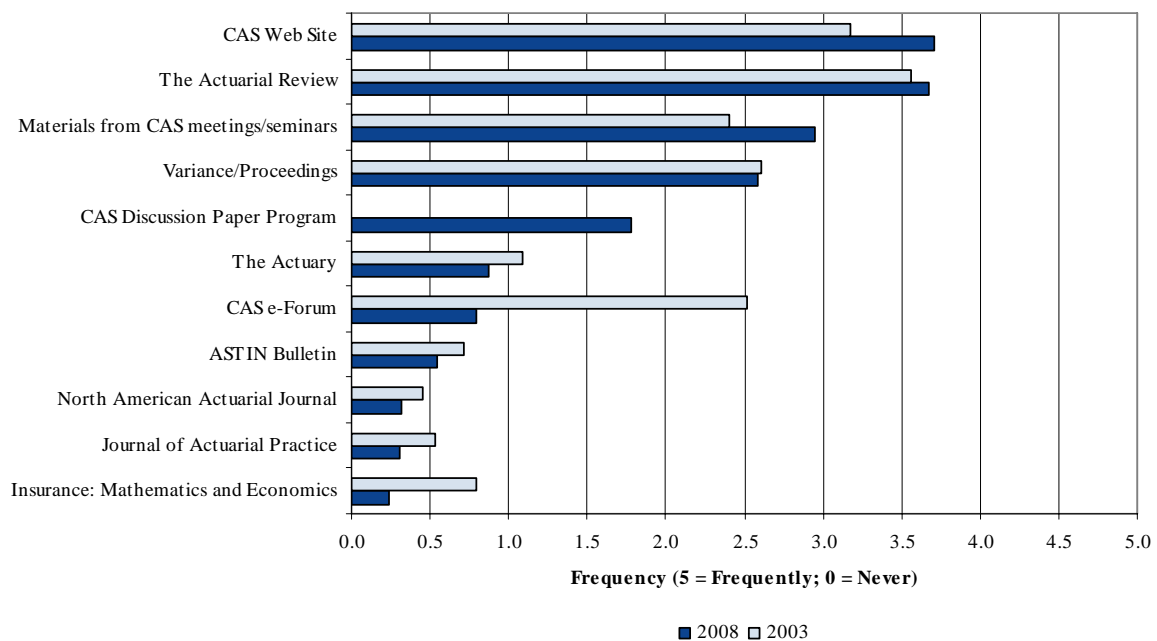
### Introduction

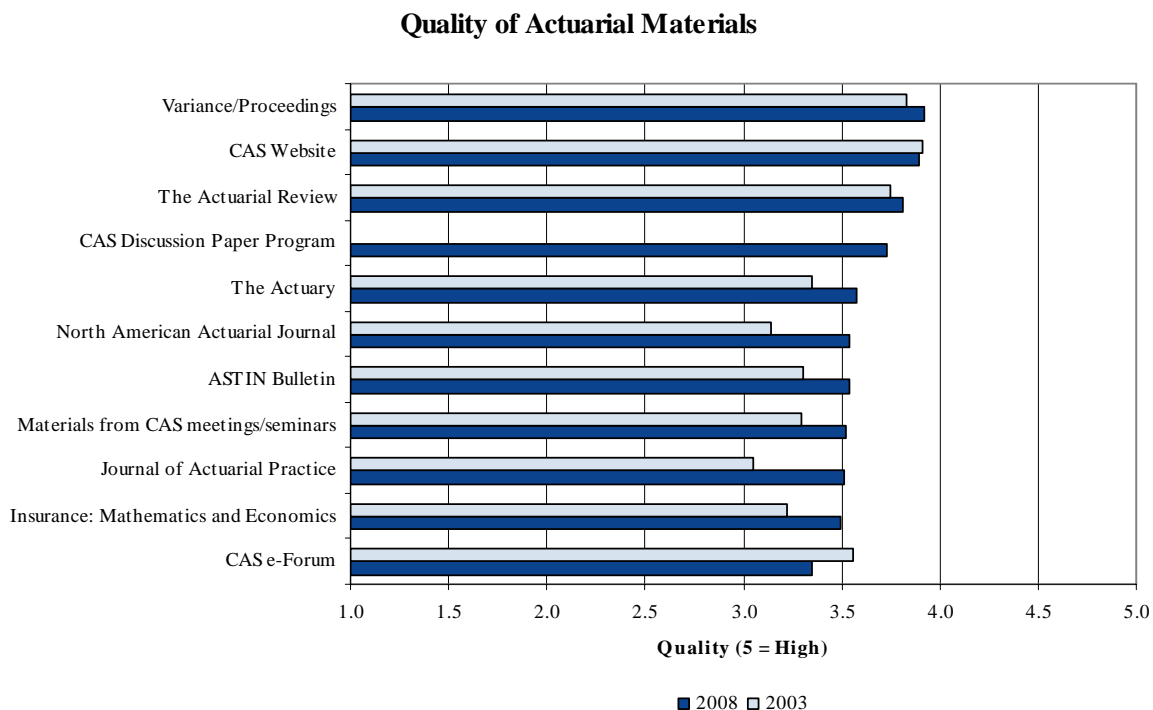
The 2003 Survey included a number of questions that the CAS Task Force on Publications used to shape recommended changes. These changes included launching the new *Variance* journal in the spring of 2007, the decision to eliminate the hard copy of the CAS Forum and Discussion papers, and the creation of *e-Forum*. The 2008 Survey included several questions on publications to measure the effect of these changes.

### Review of Specific Publications

In both the 2003 and 2008 Surveys, members were asked about the frequency with which they read eighteen different actuarial publications. They were also asked to rate the quality of each publication. The 2008 Survey was more specific than the 2003 Survey in defining the scale in terms of frequency and quality. The results are summarized in the following charts.

**Frequency that Actuarial Materials are Read**





Similar to the 2003 Survey, respondents most frequently read documents published by the CAS. Not surprisingly, respondents rated the most-read publications as the highest in quality. The CAS Web Site has surpassed the *Actuarial Review* as the most-read publication. Material from CAS-sponsored meetings is also read with high frequency. In the above charts, the e-Forum, an electronic repository that replaced the former paper Forum and Discussion Paper programs, is compared to the old Forum. Respondents appear to reference the e-Forum less frequently than its predecessor. It should be noted that e-Forum has only been in existence since August 2007. Perhaps more effort to “push” the electronic content to members, including brief abstracts of papers, could increase the frequency that members access this publication format.

### Satisfaction with CAS Publications

Roughly 60% of respondents are satisfied (*somewhat* or *very*) with the improvements in CAS publications over the past five years. Approximately 70% are satisfied with the content and availability of CAS publications, while 60% are satisfied with the frequency, organization, and format of publications. Very few respondents (less than 2%) expressed dissatisfaction with these aspects of CAS publications. Although 57% of respondents were satisfied with the CAS Web Site search tools, almost 9% expressed some level of dissatisfaction.

### Format of Publications

The survey asked members which format they wished to receive four CAS publications (*The Actuarial Review*, *Variance*, meeting/seminar notices, and monographs). The options for members were *hard copy*, *Web copy*, *both*, or *no preference*. Less than 20% of the respondents indicated an interest in receiving hard copies of meeting and seminar notices or monographs. Approximately 55%

of respondents wanted to continue to receive hard copies of *Variance*. Readers of *The Actuarial Review* leaned slightly towards Web only distribution.

### **Members' Interest in Writing Papers**

We asked members a series of questions exploring their interest in writing papers for CAS publications. Respondents' interest in writing papers for CAS publications was similar in 2008 as in 2003. The most significant barrier to writing papers is members' lack of interest in the activity, especially compared with other CAS activities. Only 10% of respondents indicated that they have written papers in the past, and a slightly higher proportion indicated that they would be interested in submitting papers for CAS publications in the future. Forty percent of respondents indicated that they did not have an interest in writing papers for CAS publications. Thirty-two percent indicated that they have less interest in writing papers than in other CAS activities, twice the proportion as the 2003 Survey.

A source of potential authors is the 23% of respondents that indicated that they were unsure if they would be qualified to write a paper sufficient for CAS publication. Increased emphasis on practical papers rather than theoretical might draw out this population of potential authors. Only 4% said they would prefer to publish papers in *Variance* because it is fully refereed, while 1% said that they would prefer to avoid the burden of peer review and submit papers to Call Paper programs or the e-Forum directly. Only 4% percent of respondents indicated that their company discouraged submission of papers due to concerns about revealing proprietary information.

### **Variance**

The new CAS peer-reviewed journal, *Variance*, appears to be well-received by members. It is read or referenced more frequently than its predecessor, *The Proceedings*. (In the 2008 Survey, 36% of respondents indicated that they read or reference *Variance* frequently, while in the 2003 Survey, 25% reported that they read or referenced *The Proceedings* frequently.) Thirty-four percent of respondents indicated that they read *Variance* sometimes.

Sixty percent of respondents rated the quality of articles as *very good* or *good*. In terms of technical difficulty, 63% found *Variance* to be *just right* or *challenging, but can be understood*. Forty-five percent thought that the length of the articles was *just right*, while 17% thought that the length of the articles were *somewhat long* or *too long*. The relevance of topics may be an area for an improvement. Only a small percentage of respondents (12%) felt that most or nearly all of the articles were relevant to their work. This may reflect the diversity of practice areas among our membership. Several respondents wrote in that they would like to see *Variance* continue to strive to provide more practical articles that readers can apply in their work. This is a theme that was repeated throughout the comments of the 2008 Survey. Respondents also suggested making spreadsheets used in the papers available on the Web Site.

## REGIONAL AFFILIATES AND SPECIAL INTEREST SECTIONS

### Recommendation

Regional affiliates should strive to increase the availability of their CE offerings in order to provide affordable and convenient education to their memberships. A number of specific suggestions for making regional affiliate meetings better are listed later in this section.

The CAS should strengthen and better communicate its relations with the International Association of Black Actuaries.

### Regional Affiliate Membership

For the first time, the 2008 Survey asked members which CAS regional affiliates(s) they are active in. Members were asked to check all organizations that applied.

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Not an active participant	40%
Midwestern Actuarial Forum	16%
Casualty Actuaries of New England	10%
Casualty Actuaries of Greater New York	8%
Casualty Actuaries of the Mid-Atlantic Region	6%
Association des Actuaire IARD	4%
Casualty Actuaries of the Southeast	4%
Ontario Conference of Consulting Actuaries	3%
Southern California Casualty Actuaries Club	3%
Southwest Actuarial Forum	3%
Casualty Actuaries of the Bay Area	2%
Casualty Actuaries of Bermuda	2%
Casualty Actuaries of Europe	1%
Casualty Actuaries of the Far East	1%
Casualty Actuaries of Desert States	1%
Casualty Actuaries of the Northwest	1%
Central States Actuarial Forum	1%

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## Reasons for Non-Involvement in Regional Affiliates

We asked members to identify the reasons for non-involvement in regional affiliates.

Reasons	2008	2003
Regional affiliate does not exist in my area	10%	N/A
Low relevance of subject matter	19%	19%
Networking opportunity limited due to small number of attendees	6%	4%
Prefer meetings with more activities and more interesting locations		13%
Prefer meetings with:		
— More activities	15%	
— More interesting locations	6%	
Don't get timely notification of meetings	4%	3%
Company does not encourage or sponsor my attendance	14%	10%
Time and costs		36%
Time	56%	
Costs	15%	
Other	18%	9%

Although 40% of respondents indicated that they are not active in a regional affiliate, only 22% of survey respondents answered this question.

We also provided an *other* category for comments. Many of the comments repeated the reasons listed in the table above. The other most frequently cited reason for non-involvement related to competing forces for time (e.g., raising children, busy at work, studying for exams, other volunteer activities, other meetings).

## Suggestions for Improving Regional Affiliate Meetings

About 170 respondents provided suggestions for making regional affiliate meetings better. Recurring suggestions included:

- CE There was strong support for maximizing the amount of qualifying CE available at each meeting.
- Distance There were a number of comments suggesting that the meeting locations were not convenient, particularly for regional affiliates that cover large geographic areas. There were a couple of suggestions to subdivide these regional affiliates for meeting purposes.

- CE and Distance There were several suggestions that regional affiliates consider offering online CE opportunities. We believe that such suggestions address both the CE and distance issues.
- Quality of the Meetings Respondents noted a varying quality of meeting content. This was particularly noted by those who belonged to more than one regional affiliate. Some noted the need for speakers with better presentation skills.
- Venue There were a number of responses that favored casino locations.
- Content There were a variety of opinions regarding content. Some cited the need for insurance speakers with a broader experience base and perspective, and others noted a desire for more technical actuarial topics.
- Keep Up the Good Work Many respondents noted that the regional affiliate meetings that they attend were “adequate,” “excellent,” or “tremendous.”

The Task Force would welcome the opportunity to work with Regional Affiliates to explore these findings in more detail.

### Special Interest Sections

The final question in this section asked members if the CAS should consider forming new practice areas beyond those that currently exist. Responses are summarized in the following table.

Yes	6%
No	9%
No Opinion	85%

Respondents who answered *yes* to this question were asked to specify areas of practice for which a new section should be formed. There were about 50 responses. Some suggested sections that already exist (e.g., risk management). Of the remaining suggestions, there was no concentration of responses in any particular area. There were, however, numerous interesting ideas, including:

- Chief Actuary
- International
- Investments
- New members
- Professional liability
- Small insurance company/consulting firm
- Ratemaking
- Reserving

We also note here that several respondents listed the International Association of Black Actuaries as an actuarial organization with which the CAS should establish a stronger relationship.



## RESEARCH AND DEVELOPMENT

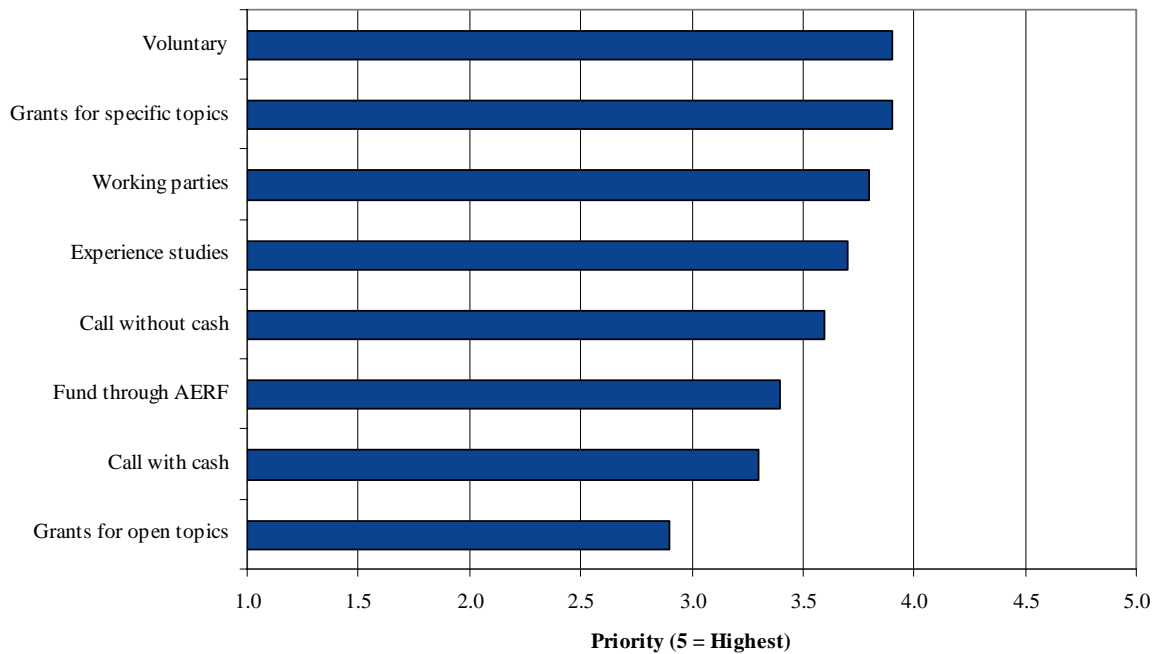
### Recommendation

There appears to be a significant gap between the techniques published and the techniques used. The results of the 2008 Survey suggest that the CAS should spend more time determining how to present published theoretical research in a clear, easy-to-understand, practical-to-implement manner that members can more readily employ in their work.

### Prioritization of Research Channels

In the 2008 Survey, CAS members were asked to prioritize eight specific channels (seven in 2003) for conducting research. The new channel added in 2008 was experience studies. Members were also provided the opportunity to suggest *other* channels.

**Priority Level for Research Channels**

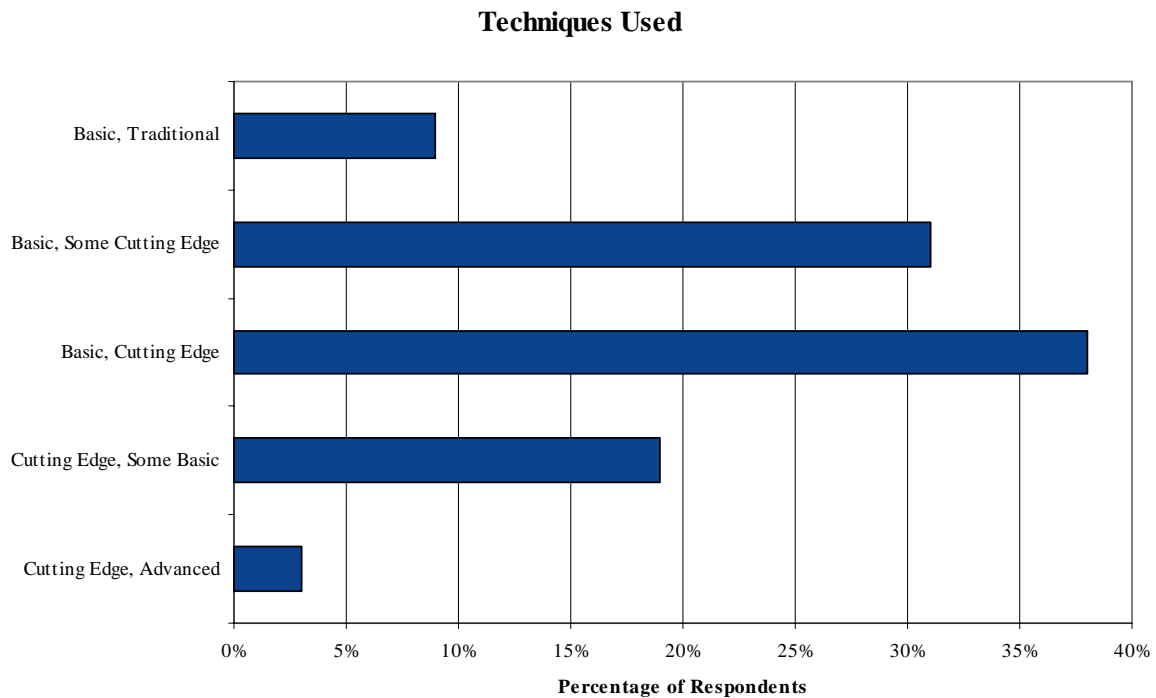


The results, which were consistent with the 2003 Survey, reflect the strong volunteer culture of the membership, with voluntary research at the top of the priority list. There was also strong support for the new channel of experience studies. Call paper programs continue to garner support, but the existence of a cash award appears to be even less important than in the 2003 Survey. Funded research gets strong support, but this support is much stronger when the CAS has complete control (specific topics), drops when there is moderate control (through jointly sponsored projects with the Actuarial Education and Research Fund (AERF), and is fairly low when the researcher gets to choose the topic.

There were minimal responses to *other* for this question. The relatively low *other* response may be interpreted as an indication that the channels listed are largely sufficient. The recurring theme of the comments was that the research needs to be more practical in nature rather than theoretical. Many members seem to agree that the amount of research focused at practical applications is minimal. Similar sentiments were observed on the 2008 Survey in a number of different questions.

## Techniques

Members were asked to describe the techniques they are using for the majority of their work by choosing a category along a spectrum from *basic, traditional approaches* to *cutting edge, advanced techniques*.

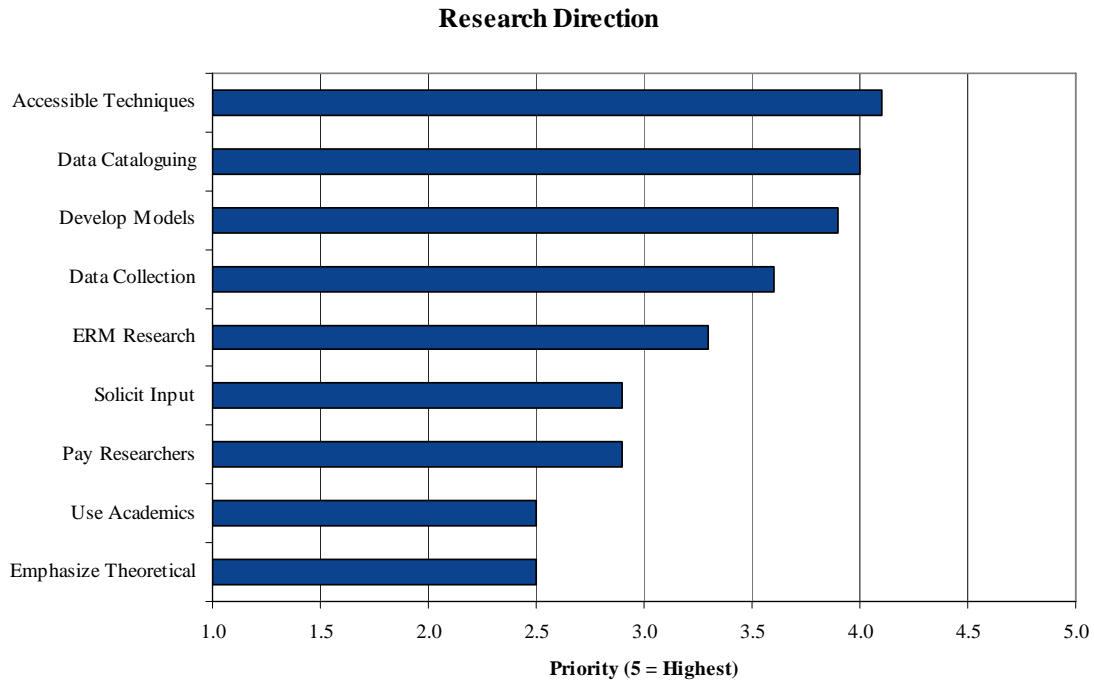


We reviewed the survey results to determine if there were differences in the use of techniques by demographic group. Cutting edge and advanced techniques were used most frequently by:

- Actuaries working at brokerage firms (43%)
- Affiliate members (38%) (which may indicate greater use of such techniques outside of North America)
- Actuaries working in organizations with more than 200 credentialed actuaries (33%)
- Actuaries working at reinsurance companies (28%)

## Research Direction

Members were asked to indicate their strength of agreement with the various methods in which CAS research can be undertaken. The results were remarkably consistent with the 2003 Survey.

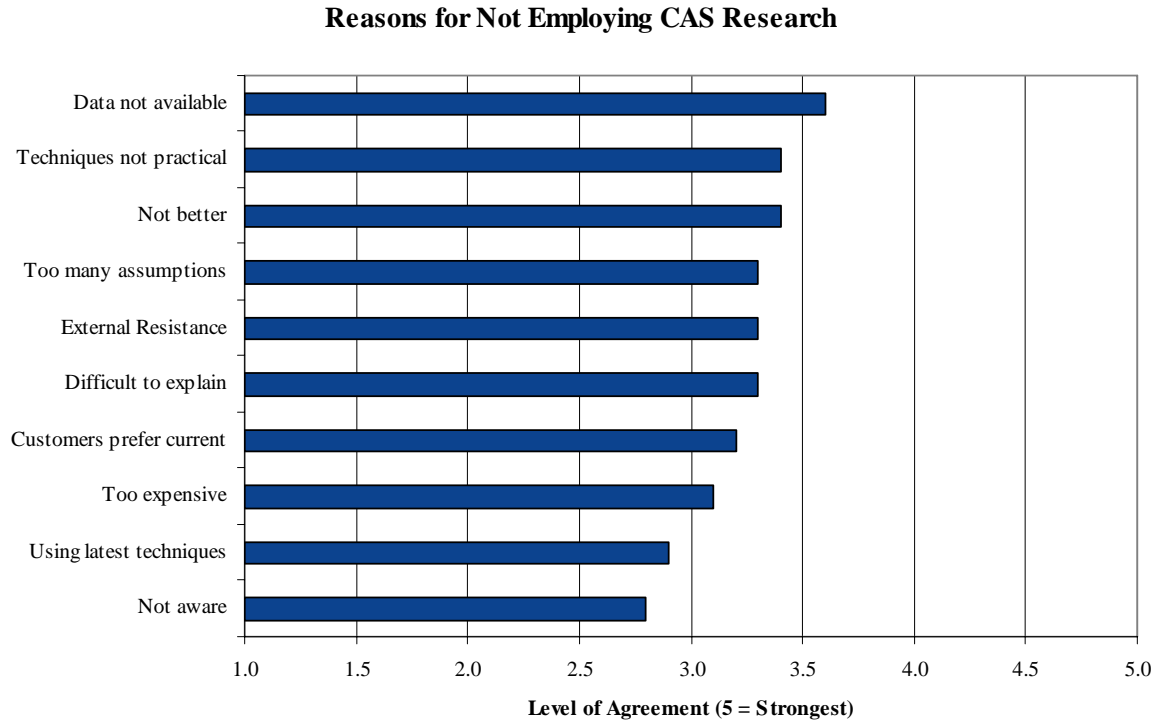


The labels on the bars are short descriptions of the actual 2008 Survey options:

- The CAS should sponsor research to make advanced techniques more accessible to, and more widely used by, the CAS membership.
- The CAS should identify and catalog sources of data that could be useful to actuaries.
- The CAS should conduct research that involves the development of actuarial models.
- The CAS should conduct research studies that involve the collection, combination, and analysis of data.
- The CAS is acting aggressively enough to provide research and education to its members on the subject of enterprise risk management.
- I would like the opportunity to provide input about areas in need of CAS research.
- The CAS should pay researchers to conduct projects and rely less on volunteers and prize/awards for research papers.
- The CAS should primarily use academics for paid research projects.
- CAS research should be primarily theoretical. Individual practitioners and companies should develop their own practical applications.

## Applications of Recent CAS Research

We asked members to indicate the reasons that they do not employ the results of recent CAS research in their work. (Members were asked to rate the level of agreement with each reason.)



Again, the labels on the bars are short descriptions of the actual 2008 Survey options:

- The required data is usually not available.
- The techniques are not practical enough to use in practice.
- I'm not sure they produce better results.
- Too many assumptions need to be made.
- Auditor, regulators, etc. may not accept these approaches.
- They are too difficult to explain to non-technical audiences.
- My management, or my clients, like the way it's done now.
- They are too expensive to use in practice.
- I do use the latest techniques.
- I am not aware of recent research in my area of practice.

In most cases, the results are similar to the 2003 Survey. There is one area that raises some concern. There was a decrease in the results for respondents who indicated that they do use the latest techniques. Again, this seems to support the theme previously mentioned that the existing research is too theoretical and not sufficiently practical for its ready adoption into use.

### **Additional Research Topics**

Members were asked to suggest additional research topics that they would like to see addressed by the CAS. Not surprisingly, the overwhelming request was for more practical and less theoretical research. There appears to be a significant gap between the techniques written about and the techniques used, and there is the perception that the gap is continuing to widen.

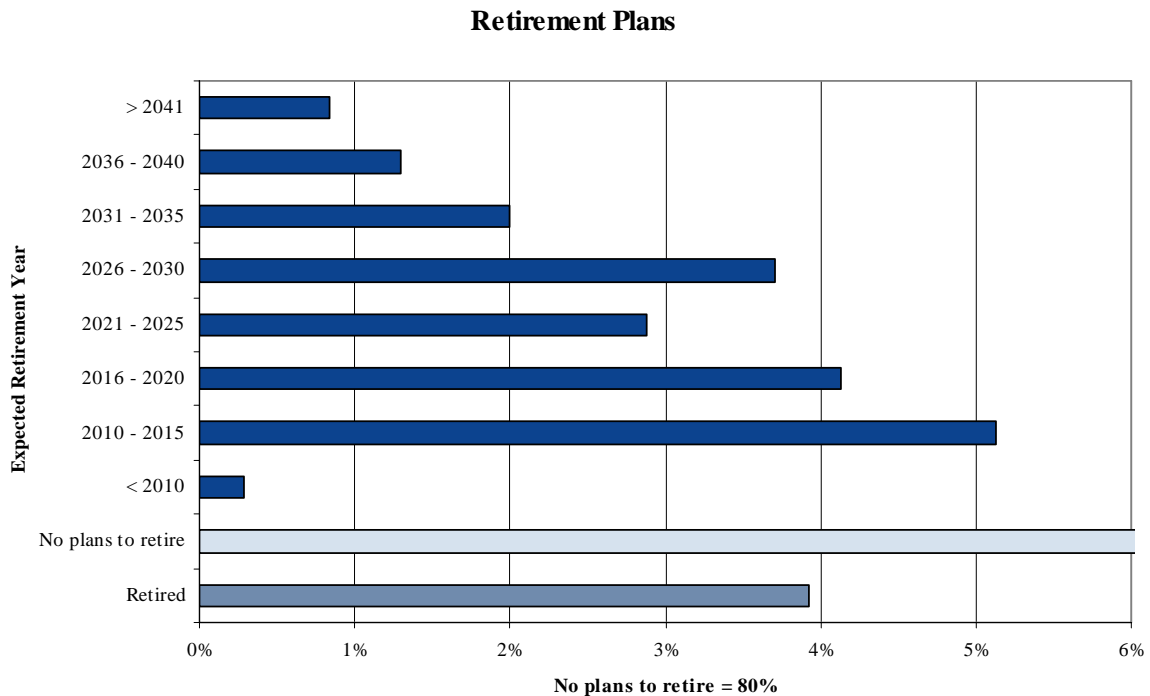
## RETIREMENT

### Recommendation

We recommend enhanced communications targeted at retired actuaries with emphasis on opportunities for involvement as well as the benefits of such involvement, since a large number of our members are planning retirement in the next 6 to 10 years

### Expected Retirement Year

The chart below summarizes the expected retirement year of those who completed the 2008 Survey.



The individual year with the largest percentage of expected retirees is 2018, with 2% of the respondents expecting to retire.

### Retiree Involvement with the CAS

We asked members about their participation in the CAS since retiring or their plans upon retirement. Of those respondents who had retired, 11% indicated that they had volunteered for committees/task forces, and 21% indicated that they had attended CAS meetings or seminars. For those who had not yet retired, 20% of respondents indicated that they planned to volunteer for committees/task forces, and 24% planned on attending CAS meetings and seminars. More than 70% of retired CAS members indicated that they were pleased with the opportunities the CAS provides to retirees.

### **CAS Opportunities for Retirees**

Members were asked for their opinions on what the CAS can do to improve the opportunities that are provided to retirees. The majority of the retired actuaries who participated in the 2008 Survey appeared to provide comments. The comments offered a variety of ideas. Some of the more frequent suggestions included significantly lower fee schedules for retirees and that the CAS provide a central site for part-time, temporary, or volunteer job opportunities.

## STRATEGIC DIRECTION

### Recommendations

We believe that the CAS should continue to focus on the competencies that support the traditional actuarial roles of ratemaking and reserving, such as predictive modeling and stochastic reserves, as these were ranked highest by actuaries as important areas for CAS' efforts and strategies.

Furthermore, there is a perceived need by the membership that the CAS address these to a greater extent in practical, not only theoretical, ways.

We recommend that the CAS develop communication strategies to better clarify its international role and goals, thus striving to alleviate the concern that the organization is too North American-focused.

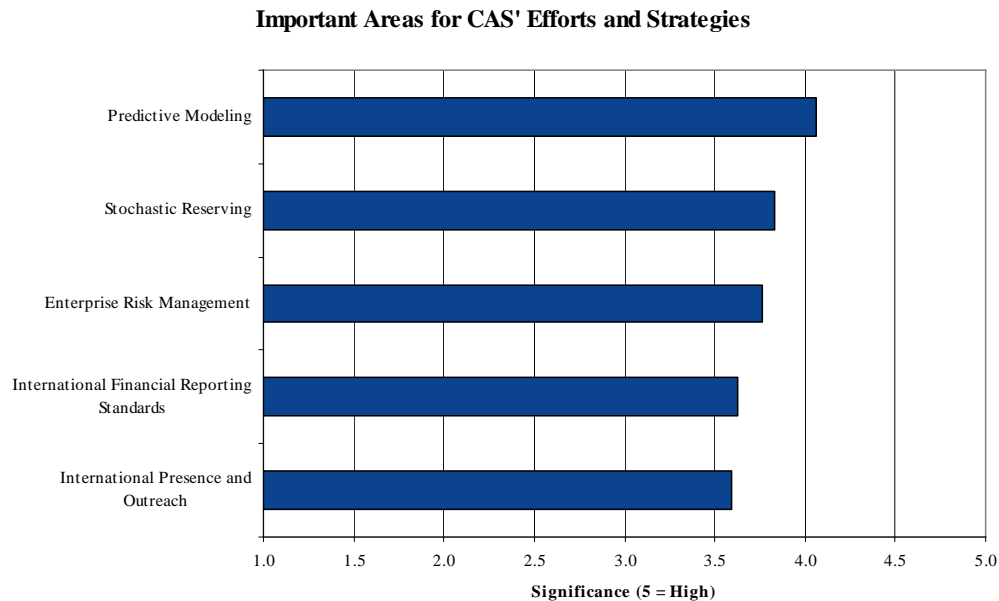
We recommend that the CAS enhance its communications regarding its role in professional standards.

### Introduction

As the CAS approaches its Centennial, progress toward the Centennial Goal and member input on CAS strategic direction is of great importance to the CAS leadership. Thus, the questions regarding strategic direction were included on both versions of the 2008 Survey.

### Important Areas for CAS' Efforts and Strategies

We asked members to indicate how significant the CAS' efforts and strategies should be in five specific areas: international presence and outreach, ERM, predictive modeling, stochastic reserving, and international financial reporting standards (IFRS). The following chart presents the average responses for each of these areas. It is interesting to note that the highest ratings were for predictive modeling and stochastic reserving, which support core functions of actuaries.





We analyzed the results to determine if there were discernable differences of opinion by demographic groupings.

### Predictive Modeling

Support for predictive modeling was high for all demographic groups. More than 80% of respondents rated this as high or very high. Eighty-five percent or more of respondents rated predictive modeling as high or very high in the following demographic groups:

- Actuaries working with employers of more than 200 actuaries
- Actuaries whose primary work place is Canada
- Actuaries in insurance companies
- Actuaries with less than ten years tenure as an FCAS

### Stochastic Reserving

The results for stochastic reserving were somewhat similar to that of predictive modeling. Nearly 70% of all demographic groups (other than those currently not employed) rated stochastic reserving as high or very high. The demographic groups that ranked this highest were:

- Actuaries working with employers of more than 200 actuaries
- Actuaries whose primary work place is Canada
- Actuaries in consulting firms
- Actuaries with less than ten years tenure as an FCAS

### ERM

ERM was the next highly rated issue, following predictive modeling and stochastic reserving. Similar to stochastic reserving, more than 60% of all demographic groups (other than those currently not employed) rated ERM as *very high* or *high*. The highest ratings were from actuaries whose primary work place is outside of the U.S. (i.e., Canada at 80% and other at 72%). It is interesting to note that more than 73% of females rated ERM as *very high* or *high* and only 66% of males rated it *very high* or *high*. This difference between females and males responses for ERM may not seem particularly large on its own. However, when compared to the four other strategic areas addressed in the 2008 Survey, the difference is quite pronounced. The differences between male and female responses ranged from 0.0% to 2.4% for the four other areas. Actuaries working at brokerage firms and actuaries with less than 10 years tenure at Fellowship were the two demographic groups with the next highest proportions of respondents indicating *high* or *very high* for ERM.

### International Financial Reporting Standards (IFRS)

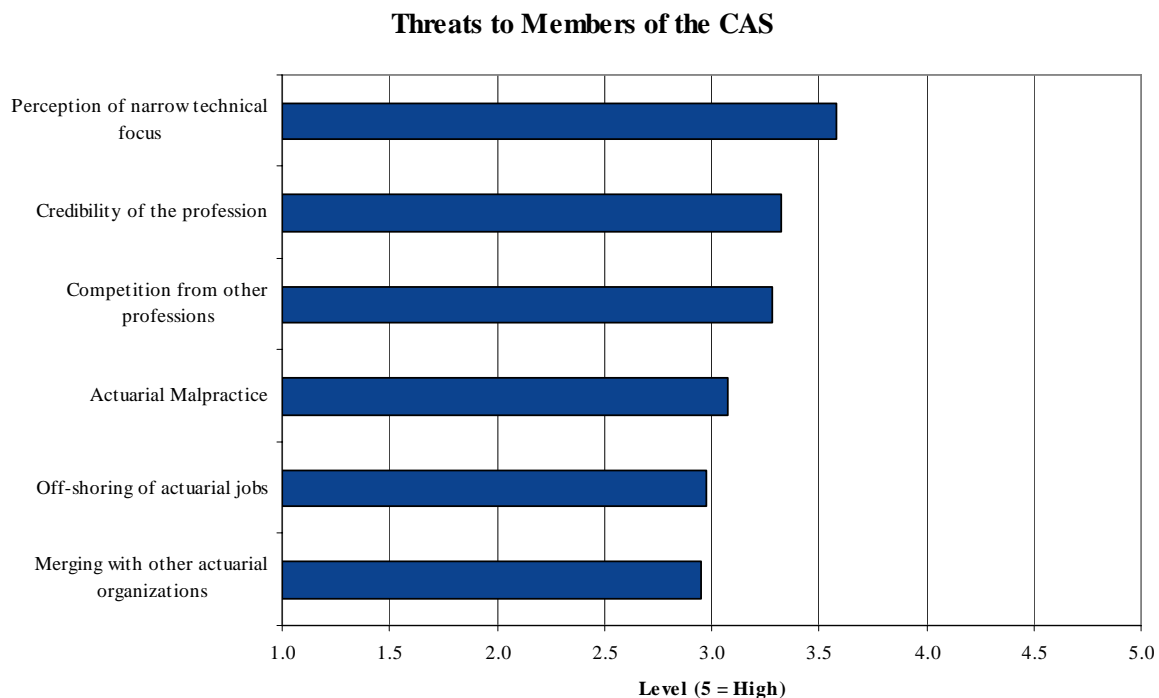
With respect to IFRS, there was a notable difference in the respondents' rankings based on their primary work place. More than 75% of respondents whose primary work place is Canada and roughly 70% of respondents whose primary work place is *other* (i.e., not in Canada or U.S.) ranked this as *high* or *very high*. This is not surprising since Canada will soon be implementing IFRS, and IFRS currently exists in many countries around the world.

## International Presence and Outreach

It is also not surprising that the highest rankings for international presence and outreach were generated by actuaries working outside of the U.S., actuaries with affiliate membership, and those with current or previous worldwide business responsibilities. There were no other discernable differences among demographic groups for this issue.

## **Threats to the CAS**

We asked members to indicate their perception of six threats to current and future members of the CAS. We also allowed members to offer additional threats that were not listed. The results of this question are summarized in the following chart.



We note that the two issues rated the highest were also seen in the comments on the weaknesses of the CAS: the perception of actuaries as having a narrow technical focus and the credibility of the actuarial profession.

More than 60 members replied to this question with *other* threats. The most frequently mentioned threat was the admissions process and specifically a perceived weakening of the admissions standards. We note that admissions consistently elicits a significant number of written comments, both positive and negative. Similar comments were seen in the Membership Satisfaction section of the 2008 Survey.

## The Role of the CAS

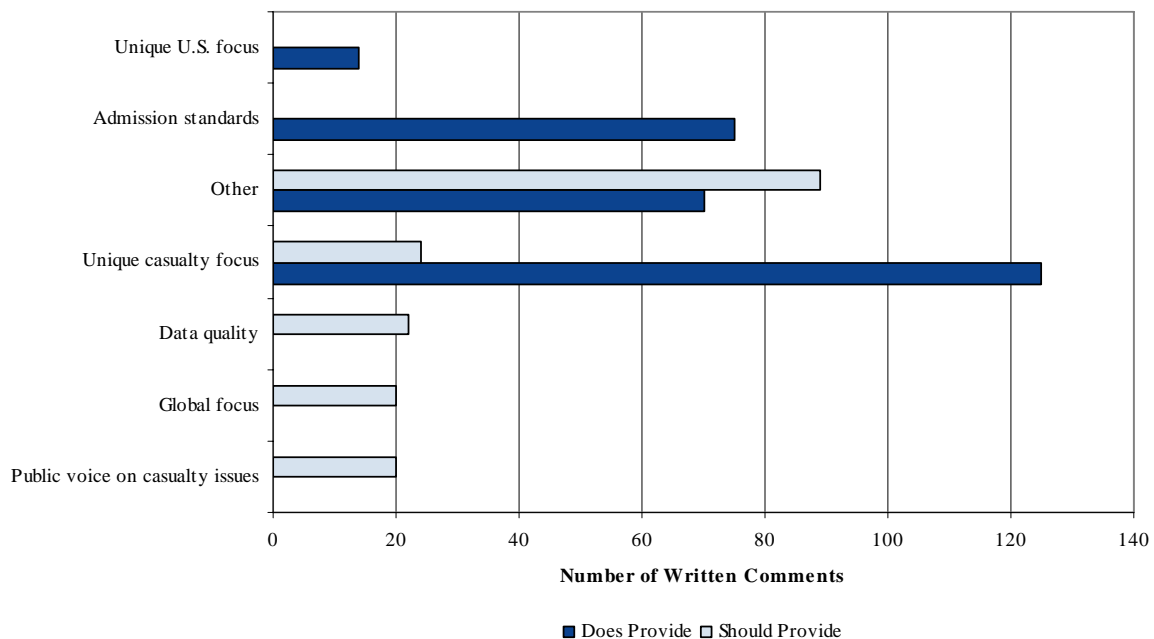
We asked members what roles or benefits the CAS does provide and what roles or benefits the CAS should provide. More than 300 members commented on the role that the CAS does provide. The most frequently cited roles/benefits that respondents believed the CAS does provide include:

- Education – basic education through examinations and CE through publications, meetings and seminars
- Property and casualty focus
- Admissions and accreditation process
- Research
- Professionalism, prestige and/or quality of the organization and its designations

We note that some members cited the CAS’s unique U.S./North American focus as a role that the CAS provides. This may be a concern for an international organization, as this issue was also raised by some members through the comments regarding weaknesses of the CAS. We also note, again with some concern, that a number of members indicated that they believed the CAS provided Standards of Practice.

There were roughly 200 members who responded to the question about what role the CAS should provide. The responses for this question were very consistent with the previous question on what the CAS does provide. Members suggested that the CAS should play a role in education and training, credentialing, and research. There was a definitive message from respondents that the CAS should continue its focus on property and casualty issues. Another recurring message was the development of practical applications and tools. This issue has been raised in a number of other sections of this report. Other frequently cited roles that the CAS should play included: management skills, international/global view of issues, and serve as the public voice of the membership.

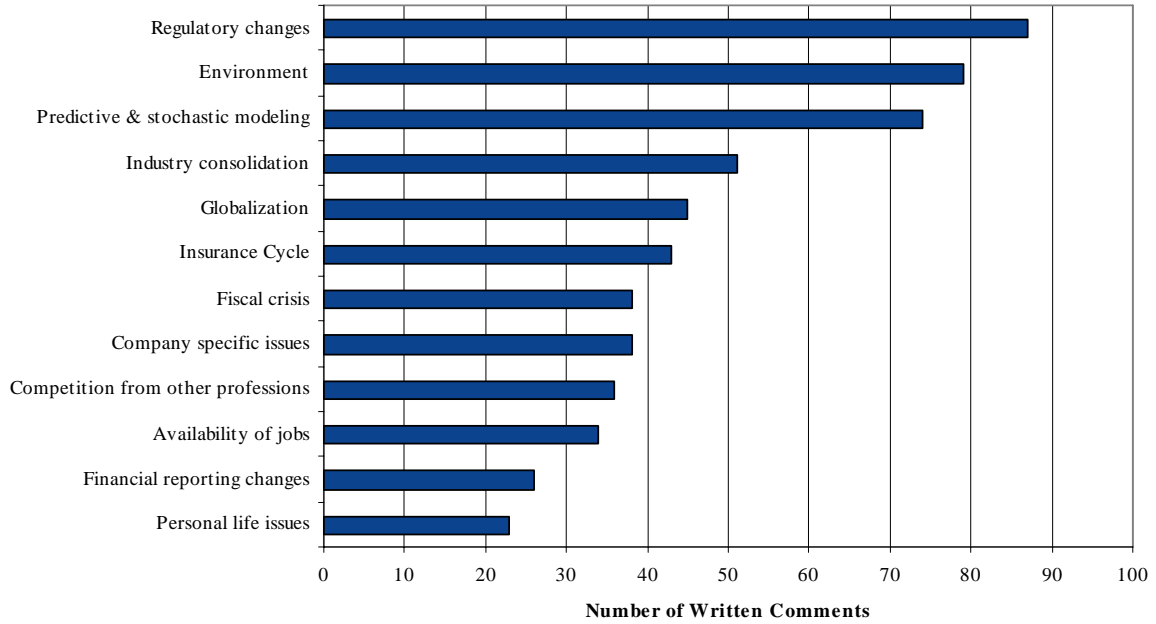
**Unique Roles or Benefits that CAS Does/Should Provide**



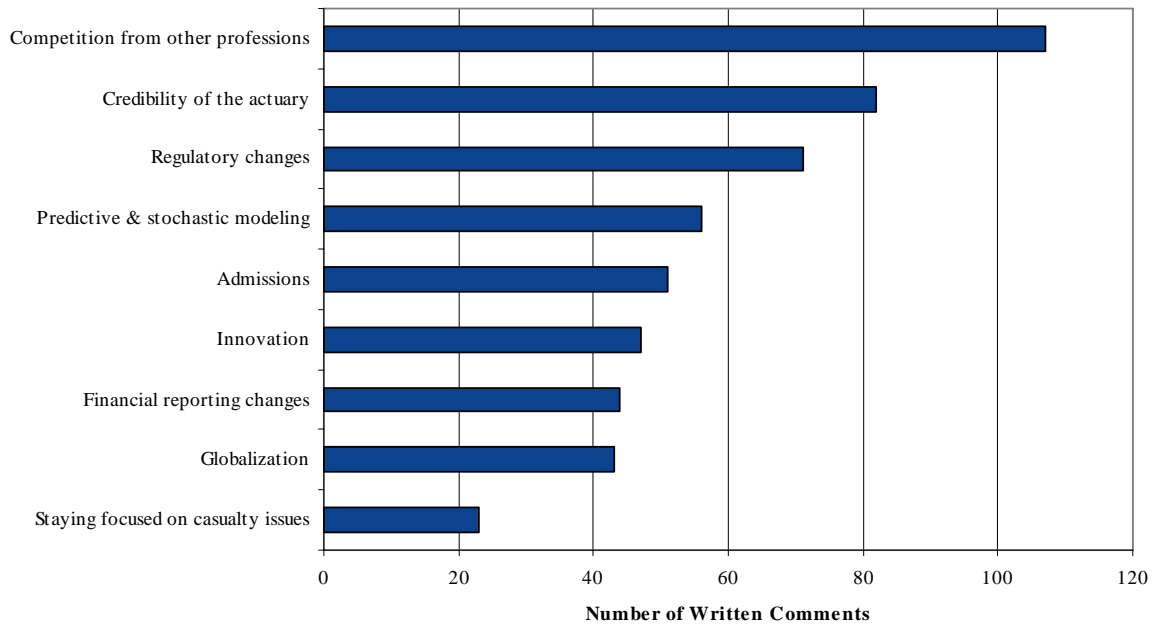
## Top Issues Affecting Actuaries and the CAS in the Next Five Years

We asked members to identify the top two issues facing them in their professional lives and the top two issues facing the CAS. We present the following two charts, which summarize the responses to these questions.

### Top Issues Impacting Professional Life in the Next Five Years



### Top Issues Impacting the CAS in the Next Five Years



## VOLUNTEERISM

### Recommendations

We offer two recommendations related to reducing the costs of members' participation in CAS volunteer activities:

- Additional subsidies for travel costs
- Alternative means of communications and meetings (e.g., video conferencing)

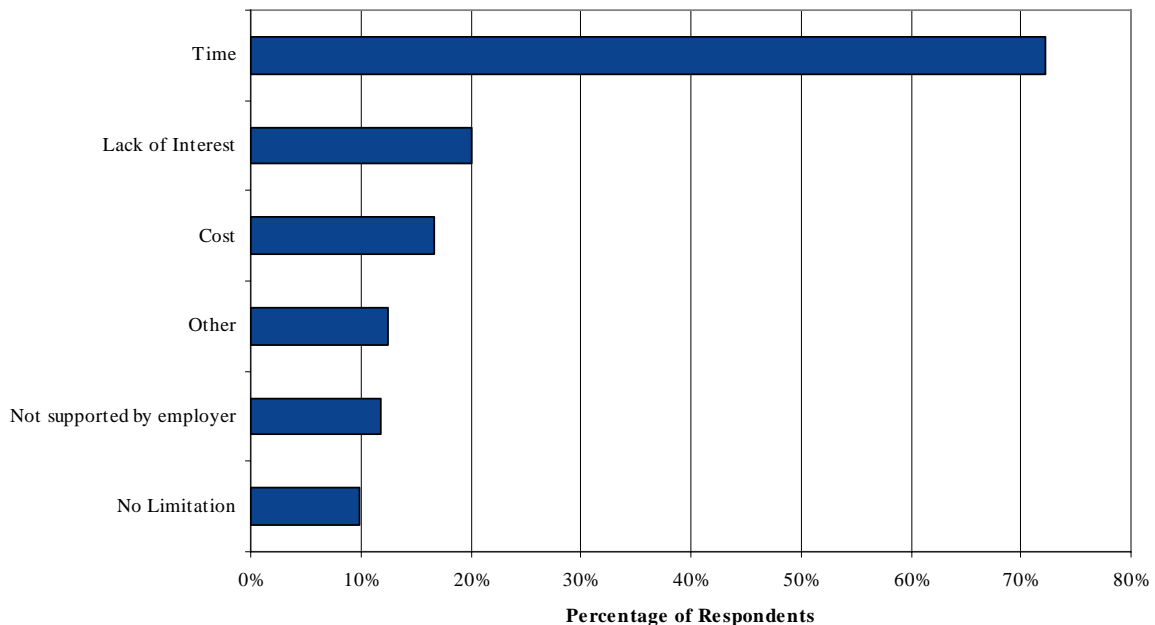
### General Rate of Involvement with the Actuarial Profession

Approximately 60% of respondents indicated that they volunteer on an annual basis in the actuarial profession. Considering that 31% of CAS members volunteered for the CAS during 2008, it appears that members who volunteer are more engaged, and therefore were more inclined to complete the 2008 Survey.

### CAS Committee and Task Force Involvement

Members were asked if there was anything preventing them from increasing their participation on CAS committees and task forces. The table below summarizes the findings from this question.

**Limitations for Volunteering**



The proportion of respondents who indicated that nothing was preventing them from increasing their participation levels doubled from 5% to 10% between 2003 and 2008. There were some material differences in the responses to this question by demographic group, which we summarize in the following table.

<b>Reasons for Limitation on Volunteering</b>	<b>Issue was Most Significant for</b>	<b>Issue was Least Significant for</b>
Cost	Retired Employment type: other Working with <50 employees	Working at brokerage firm Reinsurance company Affiliate members Working with > 200 actuaries Younger than 36
Time	Working with > 200 actuaries FCAS with < 10 years tenure	Retired Not currently employed Employment type: other
Lack of Interest	Retired Not employed as an actuary Employment type: other	Working with > 51actuaries Working at a consulting firm
Not supported by employer	Affiliate members Working with 51-200 actuaries Employment type: other	Working with > 51actuaries Canada Younger than 36

There were 151 individuals who provided *other* responses. The most frequently cited reasons were: “career associate” or “I’m not being asked to volunteer.” The next most frequently mentioned reason was “balancing work and family responsibilities.”

### **Effect of Travel Costs on Volunteer Activities**

Travel costs do appear to be an issue, particularly when you review the results of questions from this area as well as the administration section of the 2008 Survey. More than 37% of respondents indicated that they would volunteer more if travel costs were *subsidized* or *more broadly subsidized*. In the 2003 Survey, only 27% of respondents indicated that subsidization of travel costs would likely lead to an increase in their volunteer activities.

## **COMMENTS**

The Survey provided many opportunities for respondents to provide free form comments, and respondents took advantage of the chance to provide detailed thoughts, resulting in almost 150 pages of written comments. While we have included a few of the comments throughout the Report, in this section we share additional insightful comments provided by members.

The comments below are just a small sample of those provided by members. The Task Force invites CAS Committee Chairs and others in leadership roles to request the compendium of written comments that pertain to their areas of interest.

### **What is the strongest attribute of the CAS?**

- Basing the exam process/admission on actual exams and not too geared towards education credits. Anyone can pass a class in a college program, to really prove oneself an individual needs to dedicate time and focus to pass an exam.
- [T]he examination process...provides a substantial degree of assurance that a person with an ACAS or FCAS has a good understanding of actuarial principles and a very good idea of what they know...
- Companies that rely on P&C actuaries can rely on the fact that the CAS is ensuring its members are well educated in the field of P&C actuarial science and are always keeping up to date with the industry.
- I believe there has been and continues to be a significant body of knowledge disseminated to and through the members past and present that has been put into "real" life practice globally - this application of knowledge defines the "brand" the CAS has today (my humble opinion).

### **What is the weakest attribute of the CAS?**

- A highly technical view of the world which we are challenged to relate to the business environment.
- A lot of people (students especially) believe that the CAS exams are harder and take longer to complete than the SOA ones. This may prevent good students from going in our field, at least, this is what I hear from students at career fairs. Also, some universities do not offer CAS-oriented classes and therefore their students do not come in our field for that reason as well. Maybe we could do something about it in order to have more visibility.
- A number of the papers are very theoretical. It would be very desirable to have additional papers available that provide a practical application of these new methods/theories.
- Because the exam process is so onerous as to keep the supply of actuaries very small (below demand), employers are looking to other professionals to perform the same functions (e.g. Statisticians, Math PhDs). This makes them question whether or not they really need the actuaries or should be paying them what they do.
- Interestingly, I'd say the weakness is also its strength. The credential process, particularly the educational and exam process has the potential of not staying up to date and not adjusting to new business and professional needs. New areas of study take a long time to find their way onto the syllabus and the membership often avoids new complexity leaving opportunity open to others. Professional skills such as communication and presentation skills are not developed.
- The weakest attribute of the CAS is our current exam process and this weakness is putting our strongest attribute in jeopardy. I don't feel this process has done a good enough job at pushing the technical envelope of what our students are expected to know when finished with their exams. Today, students complete the exam process with little to no exposure in building statistical models whereas students with master's degrees in statistics already excel in this area and only have to surmount the short learning hurdle of how to apply these models to insurance questions

before they're better than your average actuary. Learning to build good statistical models is more difficult than learning the situation for which you're trying to apply these techniques. A hand-held calculator is simply an inadequate tool to teach this knowledge, which is what we effectively do with the current exam process. The SOA has already been requiring participation in multiple-day seminars where candidates learn to put this knowledge into practice with the appropriate tools. The fact that the CAS has yet to move in a similar direction is baffling to me. Maybe more so because I work at a company that has many managers from "that company in OH that doesn't believe in using actuaries" but I think it is a signal of what's to come. My current and personal definition of what it means to be an actuary is that an actuary understands all the business considerations necessary to accurately apply mathematical or statistical models to insurance questions of future costs. Compared to the people I've seen hired at my company in recent years, the people with masters degrees in stats far excel the actuaries at the latter half of my personal definition. Again, the first half of my definition, "understanding all the business considerations," can sufficiently be absorbed with a few years experience and without all the time and money spent on actuarial exams.

**Please provide additional comments relative to ACAS voting rights:**

- I do not support giving ACAS's rights to vote (even though I am ACAS myself). I think this will discourage people from finishing all exams and as a result will deflate the value of the CAS designation. I understand that there may be a million reasons why one would decide to stop taking exams after getting an ACAS, but I still believe an opportunity to vote on the future issues should be a part of that decision. If one still decides to stop, he/she needs to understand that it involves a forfeiture of the voting right. People should take responsibility for their decisions, and not to whine about the consequences.
- I don't believe a member's insight into the leadership of the CAS is improved because of Finance & Investments and Advanced Ratemaking (Exams 8 and 9).
- I don't believe that there is anything in the materials for the Fellowship exams that makes fellows more qualified to vote than associates. However, there is some risk that the membership would stop taking exams after achieving the ACAS designation if there were no additional benefits to attaining FCAS
- I have all but one exam, worked in the industry for over 20 years, and cannot vote. If I pass my last exam tomorrow, am I going to be more qualified to vote than I am today? I doubt it!!
- Ridiculous that only FCAS can vote. There are many life ACAS that are a credit to the organization and are treated like second class citizens. Some students come out of school with their FCAS that can vote. They have no valuable experience or insight, but they are test takers - so they can vote.

**What additional research topics would you want to see addressed by the CAS?**

- None - STOP. It would great if the next year of research was research that had already been performed presented in a very clear, very drawn out, easy-to-understand way. There is a big problem in that the gap between the techniques written about and the techniques used is continuing to widen. A whole lot of more advanced research will make this worse.

**On what topics should the CAS offer General Business Skills Educations?**

- Communication of actuarial topics to non-actuaries remains a key critical topic for us. Both writing clearly to communicate our work and in speaking/presenting our work must remain a top issue for the CAS. We have a lot to offer, but non-actuaries will shut down if we don't present our work in a clear and informative way that people can use. We need to be able to connect our work to the business.



### **Additional Membership Survey Comments**

- I feel the CAS needs to actively deal with the following concerns.
  - 1) I think actuaries today fail to understand that what makes a profession valuable is sticking with principles and quality work, even when they are unpopular. In the long run, if all we do is agree with what management wants us to say, we have no value at all. If most of the work we do is so quick and dirty as to be wrong and we don't even know it, we also have no value. I've seen both things happen. To be honest, I don't recommend this profession to people because I'm not convinced it's going to exist that long. I fear there has been a long slide towards complacency and subserviency that ultimately undermines the value of actuaries. It's a lot cheaper to hire Joe Schmo off the street and get him to say "yes" than it is to get an actuary. If management only wants yes-men, then actuaries won't survive. If we have something else to offer, we need to make sure it is clearly understood and valued. And if it isn't valued (and I fear at times that it isn't) we also won't survive.
  - 2) People need to clearly understand what is actuarial vs. what is not. And when they are under the Code of Conduct or not.
  - 3) The profession needs to support its members visibly, when members have not violated our rules. Likewise, it needs to be an adequate force against company pressure to do the wrong thing. In the UK some professional standards apply to companies hiring professionals as well as to the professionals themselves (accounting is one example, actuarial work is not). I like that model because it is hard to adequately protect members from management forces. It's hard to toe a line if you're likely to lose your job. I don't see any chance of implementing this here, but active education of both actuaries and the companies who hire them about their Codes of Conduct and their value would be a very good thing.
  - 4) In my experience, most actuaries are never troubled by professionalism concerns. They think they are mostly doing the right thing and nothing could come back to haunt them. And for the most part this has been true. If it changes, then I think there is going to be a lot of short-term headache as actuaries are prosecuted for following what are essentially industry standards. I wish actuaries were a little more afraid, because it would make them more careful. I suspect that most of us could be found guilty of violations of the Code of Conduct if anyone really went witch-hunting, because we live in an atmosphere that strongly discourages us from being careful. Being careful and professional takes time, and no one wants us to spend that time. Hopefully the violations would be judged immaterial, but I've seen what almost happened in the UK and personally it has made me wary.

## **CONCLUSION**

This report has summarized the key findings from the responses to the 2008 CAS Membership Survey. There is a great deal of additional detail contained in the survey results and cross-tabulations by demographic group that various CAS Committee and Task Force members may find relevant and interesting. The Task Force would welcome the opportunity to work with CAS committee and task force members to explore these findings in more detail.

CASUALTY ACTUARIAL SOCIETY

2008 MEMBERSHIP SURVEY A

ASSOCIATION RESEARCH, INC. (ARI), AN INDEPENDENT SURVEY RESEARCH ORGANIZATION, IS CONDUCTING THIS CONFIDENTIAL SURVEY FOR CAS. ALL RESPONSES WILL BE KEPT COMPLETELY CONFIDENTIAL.

PLEASE COMPLETE YOUR QUESTIONNAIRE NO LATER THAN OCT. 22, 2008, EITHER ONLINE OR BY FAX TO 240-268-1267. IF THERE IS A PROBLEM, PLEASE E-MAIL ASSOCIATION RESEARCH, INC., AT info@associationresearch.com

WE ENCOURAGE YOU TO COMPLETE THE SURVEY ONLINE BY GOING TO THE FOLLOWING WEB SITE: www.ari-surveys.com/run/CASmember08A

THANK YOU IN ADVANCE FOR YOUR TIME AND COMMITMENT TO CAS AND THE INDUSTRY.

DEMOGRAPHICS

1. Please indicate your current membership category and the year you attained your designation: (CHECK ONLY ONE)

Table with 2 columns: DESIGNATION/AFFILIATE and YEAR ATTAINED. Rows include 1. ACAS, 2. FCAS, 3. Affiliate.

2. What is your gender? 1. Female 2. Male

3. In what year were you born? \_\_\_\_\_

4. How many years' experience do you have working in the actuarial field (starting from the date of your first full-time property-casualty actuarial position)? \_\_\_\_\_ YEARS

5. What is your employment status? 1. Full-time 2. Part-time 3. Retired 4. Not currently employed

6. Are you currently employed as an actuary? 1. Yes 2. No

7. For what type of company or organization do you work? (CHECK ONLY ONE) 1. Insurance company 2. Reinsurance company 3. Insurance and Reinsurance company 4. (Re)Insurance broker 5. Consulting firm 6. Organization serving the insurance industry 7. Other financial institution 8. Rating agency 9. Regulatory organization 10. University or college 11. Retired 12. Full-time parent/caregiver 13. Other (SPECIFY) \_\_\_\_\_

8. Approximate number of: (CHECK ONE FOR EACH COLUMN)

Table with 2 columns: EMPLOYEES IN MY ORGANIZATION and CAS CREDENTIALLED ACTUARIES IN MY ORGANIZATION. Rows include ranges from 1-5 to More than 200.

9. Where is the physical location of the primary place in which you work?

Country: \_\_\_\_\_ State/Province: \_\_\_\_\_

**10. Do you have or have you had significant worldwide business responsibilities:**

1. Currently                       2. Previously                       3. Never

**11. In which geographic areas have you had significant business responsibilities:** (CHECK ALL THAT APPLY)

	CURRENT RESPONSIBILITIES	ANYTIME IN YOUR CAREER
a. Africa.....	<input type="checkbox"/>	<input type="checkbox"/>
b. Asia – China.....	<input type="checkbox"/>	<input type="checkbox"/>
c. Asia – India.....	<input type="checkbox"/>	<input type="checkbox"/>
d. Asia – Japan.....	<input type="checkbox"/>	<input type="checkbox"/>
e. Asia – Singapore.....	<input type="checkbox"/>	<input type="checkbox"/>
f. Asia – Other.....	<input type="checkbox"/>	<input type="checkbox"/>
g. Australia/New Zealand.....	<input type="checkbox"/>	<input type="checkbox"/>
h. Bermuda.....	<input type="checkbox"/>	<input type="checkbox"/>
i. Canada.....	<input type="checkbox"/>	<input type="checkbox"/>
j. Caribbean.....	<input type="checkbox"/>	<input type="checkbox"/>
k. Central America.....	<input type="checkbox"/>	<input type="checkbox"/>
l. Europe – Eastern.....	<input type="checkbox"/>	<input type="checkbox"/>
m. Europe – Western.....	<input type="checkbox"/>	<input type="checkbox"/>
n. Mexico.....	<input type="checkbox"/>	<input type="checkbox"/>
o. Middle East.....	<input type="checkbox"/>	<input type="checkbox"/>
p. South America.....	<input type="checkbox"/>	<input type="checkbox"/>
q. United States.....	<input type="checkbox"/>	<input type="checkbox"/>

**12. Please check all other actuarial-related organizations to which you currently belong:** (CHECK ALL THAT APPLY)

- a. American Academy of Actuaries
- b. American Society of Pension Professionals and Actuaries
- c. Conference of Consulting Actuaries
- d. Canadian Institute of Actuaries
- e. Faculty of Actuaries/Institute of Actuaries
- f. Institute of Actuaries of Australia
- g. International Actuarial Association – ASTIN
- h. International Actuarial Association – AFIR
- i. International Association of Consulting Actuaries
- j. Society of Actuaries
- k. Other organization (SPECIFY) \_\_\_\_\_

**13. What is the highest level of academic education you have completed?**

- 1. BA/BS
- 2. MA/MS
- 3. MBA
- 4. JD
- 5. PhD
- 6. Other (SPECIFY) \_\_\_\_\_

**14. Did you earn any college/university degrees in actuarial science?**

- 1. BA/BS
- 2. MA/MS
- 3. No

**15. Other professional designations:** (CHECK ALL THAT APPLY)

- a. Associate in Reinsurance (ARe)
- b. Associate in Risk Management (ARM)
- c. Associate in Investment Management and Research (AIMR)
- d. Chartered Financial Analyst (CFA)
- e. Certified Public Accountant (CPA)/Chartered Accountant (CA)
- f. Chartered Property Casualty Underwriter (CPCU)
- g. Chartered Enterprise Risk Analyst (CERA)
- h. Other (SPECIFY) \_\_\_\_\_

16. Please indicate (A) what percentage of your time over the past two years you have spent in each of the following areas (total should be 100%), and (B) indicate which of the following roles you've played in your career by checking the box to the right:

	(A) % Time Spent Past Two Years	(B) Have Done in My Career
a. Data Management/Systems Administrator .....	_____ %	<input type="checkbox"/>
b. Enterprise Risk Management.....	_____ %	<input type="checkbox"/>
c. Executive Management.....	_____ %	<input type="checkbox"/>
d. Expert Witness .....	_____ %	<input type="checkbox"/>
e. Investments .....	_____ %	<input type="checkbox"/>
f. Management of Actuarial Unit.....	_____ %	<input type="checkbox"/>
g. Planning – Strategic and Financial .....	_____ %	<input type="checkbox"/>
h. Predictive Modeling.....	_____ %	<input type="checkbox"/>
i. Pricing .....	_____ %	<input type="checkbox"/>
j. Product Development.....	_____ %	<input type="checkbox"/>
k. Programming/Software Development .....	_____ %	<input type="checkbox"/>
l. Regulation .....	_____ %	<input type="checkbox"/>
m. Reserving .....	_____ %	<input type="checkbox"/>
n. Risk & Capital Management (e.g., DFA).....	_____ %	<input type="checkbox"/>
o. Teaching/Research.....	_____ %	<input type="checkbox"/>
p. Underwriting/Marketing .....	_____ %	<input type="checkbox"/>
q. Valuation .....	_____ %	<input type="checkbox"/>
r. Other (SPECIFY) .....	_____ %	<input type="checkbox"/>
<b>TOTAL</b> .....	<b>100%</b>	

17. Leadership positions you have held in the last three years: (CHECK ALL THAT APPLY)

- a. CAS Board or Executive Council
- b. Chair of a CAS Committee
- c. Member of a CAS Committee
- d. Another actuarial organization's Board, Executive Council, or Committee
- e. None of the above

18. Do you currently serve as a Member Advisory Panelist for CAS?  1. Yes  2. No

## MEMBER SATISFACTION

19. Do you consider the return on CAS dues investment to be:

- 1. Greater than expected
- 2. Equal to expectation
- 3. Less than expected

20. If you feel that the dues and services/benefits are not in line with each other, what would need to be done to bring them in line? Please explain/specify:

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21. How satisfied are you with the following aspects of CAS:

	Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Not Satisfied At All	No Opinion
a. Overall Satisfaction with CAS .....	1	2	3	4	5	<input type="checkbox"/>
b. CAS Leadership (Board and Officers) .....	1	2	3	4	5	<input type="checkbox"/>
c. Committee Chairs .....	1	2	3	4	5	<input type="checkbox"/>
d. Professional Staff.....	1	2	3	4	5	<input type="checkbox"/>
e. Communications/Publications.....	1	2	3	4	5	<input type="checkbox"/>
f. Meetings/Professional Education .....	1	2	3	4	5	<input type="checkbox"/>
g. Admissions/Credentialing.....	1	2	3	4	5	<input type="checkbox"/>

22. What is the **strongest** attribute of the CAS? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

23. What is the **weakest** attribute of CAS? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**YOUR RETIREMENT**

24. If you have retired, in what year did you retire? \_\_\_\_\_

25. If you have not retired, when do you plan to retire?

- a. \_\_\_\_\_  b. Have not made plans

26. (A) have you participated in the following CAS activities since retiring or (B) do you plan to participate in the following CAS activities upon retirement: (CHECK ALL THAT APPLY)

	HAVE PARTICIPATED	PLAN TO PARTICIPATE	DON'T KNOW
a. Volunteer for Committees/Task Forces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Attend CAS Meetings or Seminars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Other (SPECIFY) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

27. If you are retired, are you pleased with the opportunities that the CAS provides to retirees?

1. Yes  2. No

28. What can the CAS do to improve the opportunities provided to retirees? Please explain/specify:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**REGIONAL AFFILIATES**

29. In which CAS Regional Affiliate(s) are you an active member? (CHECK ALL THAT APPLY)

- a. Association des Actuares IARD (AAIARD)
- b. Casualty Actuaries of the Bay Area (CABA)
- c. Casualty Actuaries of Bermuda (CABER)
- d. Casualty Actuaries of Europe (CAE)
- e. Casualty Actuaries of the Far East (CAFE)
- f. Casualty Actuaries of Desert States (CADS)
- g. Casualty Actuaries of Greater New York (CAGNY)
- h. Casualty Actuaries of the Mid-Atlantic Region (CAMAR)
- i. Casualty Actuaries of New England (CANE)
- j. Casualty Actuaries of the Northwest (CANW)
- k. Casualty Actuaries of the Southeast (CASE)
- l. Central States Actuarial Forum (CSAF)
- m. Midwestern Actuarial Forum (MAF)
- n. Ontario Conference of Casualty Actuaries (OCCA)
- o. Southern California Casualty Actuaries Club (SCCAC)
- p. Southwest Actuarial Forum (SWAF)
- q. Not an active participant

**30. If you are not an active member/participant in a CAS Regional Affiliate, why not?** (CHECK ALL THAT APPLY)

- a. Regional affiliate does not exist in my area
- b. Low relevance of subject matter
- c. Networking opportunity limited due to small number of attendees
- d. Prefer to go to meetings with more activities
- e. Prefer to go to meetings with more interesting locations
- f. Don't get timely information regarding the dates and locations of the meetings
- g. Company doesn't encourage or sponsor my attendance
- h. Time
- i. Costs
- j. Other (SPECIFY) \_\_\_\_\_

**31. Please provide your suggestions for making the Regional Affiliate meetings better:**

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**32. Special Interest Sections [such as Casualty Actuaries in Reinsurance (CARE), Casualty Actuaries in Regulation (AIR), Joint Risk Management Section, and the Seasoned Actuaries Section] serve the needs of actuaries in particular areas of practice. Are there other practice areas that the CAS should consider forming a Section?**

- 1. Yes (SPECIFY) \_\_\_\_\_
- 2. No
- 3. No opinion

**PUBLICATIONS**

**33. How would you rate the following features of *Variance*?**

**a. Quality of articles**

- |                                       |                                  |                                     |                                  |                                       |  |
|---------------------------------------|----------------------------------|-------------------------------------|----------------------------------|---------------------------------------|--|
| VERY GOOD<br><input type="checkbox"/> | GOOD<br><input type="checkbox"/> | AVERAGE<br><input type="checkbox"/> | POOR<br><input type="checkbox"/> | VERY POOR<br><input type="checkbox"/> | NO OPINION<br><input type="checkbox"/> |
|---------------------------------------|----------------------------------|-------------------------------------|----------------------------------|---------------------------------------|--|

**b. Technical Difficulty**

- |   |   |   |   |  |  |
|---|---|---|---|--|--|
| VERY<br>DIFFICULT<br><input type="checkbox"/> | CHALLENGING, BUT<br>CAN BE UNDERSTOOD<br><input type="checkbox"/> | JUST<br>RIGHT<br><input type="checkbox"/> | SOMEWHAT<br>BASIC<br><input type="checkbox"/> | TOO<br>BASIC<br><input type="checkbox"/> | NO OPINION<br><input type="checkbox"/> |
|---|---|---|---|--|--|

**c. Relevance of Topics to Your Work**

- |  |  |  |   |  |  |
|--|--|--|---|--|--|
| NEARLY ALL ARE<br>TOTALLY RELEVANT<br><input type="checkbox"/> | MOST ARE<br>RELEVANT<br><input type="checkbox"/> | SOME ARE<br>RELEVANT<br><input type="checkbox"/> | A FEW<br>ARE RELEVANT<br><input type="checkbox"/> | NONE ARE<br>RELEVANT<br><input type="checkbox"/> | NO OPINION<br><input type="checkbox"/> |
|--|--|--|---|--|--|

**d. Length of Articles**

- |   |  |   |   |  |  |
|---|--|---|---|--|--|
| TOO<br>LONG<br><input type="checkbox"/> | SOMEWHAT<br>LONG<br><input type="checkbox"/> | JUST<br>RIGHT<br><input type="checkbox"/> | SOMEWHAT<br>SHORT<br><input type="checkbox"/> | TOO<br>SHORT<br><input type="checkbox"/> | NO OPINION<br><input type="checkbox"/> |
|---|--|---|---|--|--|

**e. Please provide additional comments on *Variance*:**

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**34. The following CAS publications are available both electronically and in hard-copy format. In the future, in which format would you prefer to receive the following:**

	HARD COPY	WEB COPY	BOTH	No PREFERENCE
a. <i>The Actuarial Review</i> .....	1	2	3	<input type="checkbox"/>
b. <i>Variance</i> .....	1	2	3	<input type="checkbox"/>
c. Meeting/Seminar Notices.....	1	2	3	<input type="checkbox"/>
d. Monographs (under development) .....	1	2	3	<input type="checkbox"/>

**35. Please describe your interest in writing and submitting papers for CAS publication:**

(CHECK ALL THAT APPLY)

- a. I have written papers for CAS publications in the past
- b. I am interested and plan to submit papers for CAS publication in the future
- c. I (would) prefer to publish papers in the *Variance* because it is fully refereed
- d. I (would) prefer to avoid the burden of peer review in *Variance* and submit papers only to call paper programs or the *E-Forum* directly
- e. I have less interest in writing papers than in other CAS activities
- f. My company discourages submissions of papers to CAS publication due to concerns with revealing proprietary information
- g. I'm unsure whether I'm qualified to write papers sufficient for CAS publication
- h. I have no interest in writing papers for future CAS publication

**36. Please provide additional comments on writing for CAS publication:**

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## GOVERNANCE/ELECTIONS

**37. Did you vote in the last CAS election?** (CHECK ONLY ONE)

- 1. Yes, I cast votes for all offices
- 2. Yes, I cast vote for some, but not all offices
- 3. No
- 4. I can't remember

**38. Are you satisfied with the process currently being used to nominate the CAS members as:**

	YES	No	NOT FAMILIAR WITH PROCESS
a. Board of Directors .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Vice Presidents .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. President-Elect.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**39. The CAS Board recently voted to affirm the current classes of membership (Associate, Fellow, and Affiliate). At this time, only Fellows have the right to vote in CAS elections. Should Associates be allowed to vote in the elections for CAS President-Elect and Directors?**

- 1. No
- 2. Yes, immediately upon achieving ACAS
- 3. Yes, after a waiting period of (SPECIFY) \_\_\_\_\_ years

**40. Please provide additional comments relative to ACAS voting rights:**

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**41. If Associates were eligible to vote in CAS elections, should Associates who qualify as voting members be entitled to:** (CHECK ALL THAT APPLY)

- a. Stand for election to the Board of Directors
- b. Serve as Vice Presidents on the Executive Council (with the exception of Vice President – Admissions)
- c. Other (SPECIFY) \_\_\_\_\_

**RESEARCH AND DEVELOPMENT**

**42. Please indicate the priority level for the types of research on which the CAS could focus:**

	High Priority		Neutral		Low Priority	No Opinion
a. Call paper programs <u>with</u> cash awards .....	1	2	3	4	5	<input type="checkbox"/>
b. Call paper programs <u>without</u> cash awards .....	1	2	3	4	5	<input type="checkbox"/>
c. Funded research grants for specific topics.....	1	2	3	4	5	<input type="checkbox"/>
d. Funded research grants allowing proposers to choose topics .....	1	2	3	4	5	<input type="checkbox"/>
e. Voluntary research and submission papers .....	1	2	3	4	5	<input type="checkbox"/>
f. Fund research through Actuarial Education Research Fund (AERF).....	1	2	3	4	5	<input type="checkbox"/>
g. Experience studies .....	1	2	3	4	5	<input type="checkbox"/>
h. Working parties (papers written by a group of researchers) .....	1	2	3	4	5	<input type="checkbox"/>
i. Other (SPECIFY) _____..	1	2	3	4	5	<input type="checkbox"/>

**43. One a scale of 1 to 5, where 1 represents 100% use of basic and traditional approaches and 5 represents 100% use of cutting edge and advanced techniques, what best describes the techniques you are using today for the majority of your work?**

BASIC, TRADITIONAL APPROACHES					CUTTING EDGE, ADVANCED TECHNIQUES
1	2	3	4	5	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**44. Please indicate your level of agreement with the statements below:**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
a. The CAS should sponsor research to make advanced techniques more accessible to, and more widely used by, the CAS membership .....	1	2	3	4	5
b. The CAS should conduct research that involves the development of actuarial models.....	1	2	3	4	5
c. The CAS should conduct research studies that involve the collection, combination, and analysis of data .....	1	2	3	4	5
d. The CAS should pay researchers to conduct projects and rely less on volunteers and prize/awards for research papers	1	2	3	4	5
e. The CAS should primarily use academics for paid research projects.....	1	2	3	4	5
f. CAS research should be primarily theoretical. Individual practitioners and companies should develop their own practical applications.....	1	2	3	4	5
g. I would like the opportunity to provide input about areas in need of CAS research .....	1	2	3	4	5
h. The CAS should identify and catalog sources of data that could be useful to actuaries .....	1	2	3	4	5
i. The CAS is acting aggressively enough to provide research and education to its members on the subject of enterprise risk management.....	1	2	3	4	5

**45. To what extent do the following prevent you from employing the results of recent CAS research in your work?**

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
a. Too many assumptions need to be made.....	1	2	3	4	5
b. They are too difficult to explain to non-technical audiences ..	1	2	3	4	5
c. The required data is usually not available .....	1	2	3	4	5
d. They are too expensive to use in practice .....	1	2	3	4	5
e. I am not aware of recent research in my area of practice.....	1	2	3	4	5
f. The techniques are not practical enough to use in practice ..	1	2	3	4	5
g. I'm not sure they produce better results.....	1	2	3	4	5
h. Auditors, regulators, etc. may not accept these approaches	1	2	3	4	5
i. My management, or my clients, like the way it's done now .	1	2	3	4	5
j. I do use the latest techniques .....	1	2	3	4	5

**46. What additional research topics would you want to see addressed by the CAS?**

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**PROFESSIONAL EDUCATION**

**47. How many total hours of continuing education have you completed in the last three years?**

CE HOURS

- 1. Organized activities (e.g., attendance at meetings or seminars) \_\_\_\_\_ hours
- 2. Other activities (e.g., reading research articles) \_\_\_\_\_ hours

**48. The American Academy of Actuaries (AAA) revised Qualification Standards for actuaries practicing in the United States became effective Jan. 1, 2008. Do you believe that the communication about the revised Standards has been sufficient?**

- 1. Yes
- 2. No
- 3. Not applicable because (SPECIFY) \_\_\_\_\_

**49. How do you anticipate fulfilling your continuing education requirements for the coming year?**

(CHECK ALL THAT APPLY)

- a. I believe that I am exempt from continuing education requirements
- b. CAS Meetings
- c. CAS Seminars
- d. Regional Affiliate Meetings
- e. Limited Attendance Seminars
- f. CAS Webinars
- g. Webcasts of CAS Meeting sessions
- h. Through my own company's offerings
- i. Through other professional organizations' offerings
- j. Reading research articles, papers, books, etc.
- k. Desktop application learning tools (Web based or CD-ROM based)
- l. Other (SPECIFY) \_\_\_\_\_

**50. If you have not attended at least one CAS meeting or seminar in the last year, why not?**

(CHECK ALL THAT APPLY)

- a. Cost
- b. Content
- c. Length of meeting
- d. Location
- e. Timing of meeting in the calendar year
- f. Personal commitments
- g. Work commitments
- h. I believe that I am exempt from continuing education requirements
- i. Other (SPECIFY) \_\_\_\_\_

51. What topics would you most like to see offered at future CAS continuing education programs?

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52. Should the CAS continue to offer General Business Skills Education?  1. Yes  2. No

53. On what topics should the CAS offer General Business Skills Education?

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## ADMISSIONS

54. Should the CAS award exam credit based on performance in accredited courses in universities?

1. Yes  2. No  3. No Opinion

55. Should the CAS expand cooperation with the SOA by increasing the number of exams offered jointly?

1. Yes  2. No  3. No Opinion

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## CAS STRATEGIC DIRECTION

56. How significant should the CAS's efforts and strategies be in the following:

	Very High	High	Neutral	Low	Very Low
a. International Presence and Outreach.....	1	2	3	4	5
b. Enterprise Risk Management.....	1	2	3	4	5
c. Predictive Modeling .....	1	2	3	4	5
d. Stochastic Reserving .....	1	2	3	4	5
e. International Financial Reporting Standards .....	1	2	3	4	5

57. How would you rate the following threats to current and future members of the CAS?

	Very High	High	Neutral	Low	Very Low
a. Off-shoring of actuarial jobs from the United States .....	1	2	3	4	5
b. Merging with other actuarial organizations.....	1	2	3	4	5
c. Credibility of the actuarial profession.....	1	2	3	4	5
d. Actuarial malpractice .....	1	2	3	4	5
e. Competition from other professions.....	1	2	3	4	5
f. Perception of actuaries as having a narrow technical focus .....	1	2	3	4	5
g. Other threats (SPECIFY) _____	1	2	3	4	5

58. Of the various actuarial organizations in North America and the world, what unique roles or benefits:

a. does the CAS provide? \_\_\_\_\_

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b. should the CAS provide? \_\_\_\_\_

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59. What are the top two issues that will impact your professional life in the next five years?

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_

60. What are the top two issues that will impact the CAS in the next five years?

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_

OPTIONAL: To be entered into the drawing for the \$100 cash prize, please include your contact information:

NAME: \_\_\_\_\_

COMPANY: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

E-MAIL: \_\_\_\_\_

---

**THANK YOU VERY MUCH FOR COMPLETING THIS SURVEY.**

**IF YOU ARE NOT COMPLETING THE SURVEY ONLINE, PLEASE FAX YOUR QUESTIONNAIRE DIRECTLY TO:**



**FAX: 240-268-1267**

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**ASSOCIATION RESEARCH, INC.  
15200 SHADY GROVE ROAD, SUITE 306  
ROCKVILLE, MD 20850**

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**DEADLINE: OCTOBER 22, 2008**

<p><b>IF YOU PREFER TO COMPLETE THE SURVEY ONLINE, PLEASE DO SO BY GOING TO THIS WEB SITE: <a href="http://www.ari-surveys.com/run/CASmember08A">www.ari-surveys.com/run/CASmember08A</a></b></p>
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CASUALTY ACTUARIAL SOCIETY

2008 MEMBERSHIP SURVEY B

ASSOCIATION RESEARCH, INC. (ARI), AN INDEPENDENT SURVEY RESEARCH ORGANIZATION, IS CONDUCTING THIS CONFIDENTIAL SURVEY FOR CAS. ALL RESPONSES WILL BE KEPT COMPLETELY CONFIDENTIAL.

PLEASE COMPLETE YOUR QUESTIONNAIRE NO LATER THAN OCT. 22, 2008, EITHER ONLINE OR BY FAX TO 240-268-1267. IF THERE IS A PROBLEM, PLEASE E-MAIL ASSOCIATION RESEARCH, INC., AT info@associationresearch.com

WE ENCOURAGE YOU TO COMPLETE THE SURVEY ONLINE BY GOING TO THE FOLLOWING WEB SITE: www.ari-surveys.com/run/CASmember08B

THANK YOU IN ADVANCE FOR YOUR TIME AND COMMITMENT TO CAS AND THE INDUSTRY.

DEMOGRAPHICS

1. Please indicate your current membership category and the year you attained your designation:

(CHECK ONLY ONE)

Table with 2 columns: DESIGNATION/AFFILIATE and YEAR ATTAINED. Rows include 1. ACAS, 2. FCAS, 3. Affiliate.

2. What is your gender? 1. Female 2. Male

3. In what year were you born? \_\_\_\_\_

4. How many years' experience do you have working in the actuarial field (starting from the date of your first full-time property-casualty actuarial position)? \_\_\_\_\_ YEARS

5. What is your employment status? 1. Full-time 2. Part-time 3. Retired 4. Not currently employed

6. Are you currently employed as an actuary? 1. Yes 2. No

7. For what type of company or organization do you work? (CHECK ONLY ONE) 1. Insurance company 2. Reinsurance company 3. Insurance and Reinsurance company 4. (Re)Insurance broker 5. Consulting firm 6. Organization serving the insurance industry 7. Other financial institution 8. Rating agency 9. Regulatory organization 10. University or college 11. Retired 12. Full-time parent/caregiver 13. Other (SPECIFY) \_\_\_\_\_

8. Approximate number of: (CHECK ONE FOR EACH COLUMN)

Table with 2 columns: EMPLOYEES IN MY ORGANIZATION and CAS CREDENTIALLED ACTUARIES IN MY ORGANIZATION. Rows include ranges from 1-5 to More than 200.

9. Where is the physical location of the primary place in which you work?

Country: \_\_\_\_\_ State/Province: \_\_\_\_\_

**10. Do you have or have you had significant worldwide business responsibilities:**

1. Currently                       2. Previously                       3. Never

**11. In which geographic areas have you had significant business responsibilities:** (CHECK ALL THAT APPLY)

	CURRENT RESPONSIBILITIES	ANYTIME IN YOUR CAREER
a. Africa.....	<input type="checkbox"/>	<input type="checkbox"/>
b. Asia – China.....	<input type="checkbox"/>	<input type="checkbox"/>
c. Asia – India.....	<input type="checkbox"/>	<input type="checkbox"/>
d. Asia – Japan.....	<input type="checkbox"/>	<input type="checkbox"/>
e. Asia – Singapore.....	<input type="checkbox"/>	<input type="checkbox"/>
f. Asia – Other.....	<input type="checkbox"/>	<input type="checkbox"/>
g. Australia/New Zealand.....	<input type="checkbox"/>	<input type="checkbox"/>
h. Bermuda.....	<input type="checkbox"/>	<input type="checkbox"/>
i. Canada.....	<input type="checkbox"/>	<input type="checkbox"/>
j. Caribbean.....	<input type="checkbox"/>	<input type="checkbox"/>
k. Central America.....	<input type="checkbox"/>	<input type="checkbox"/>
l. Europe – Eastern.....	<input type="checkbox"/>	<input type="checkbox"/>
m. Europe – Western.....	<input type="checkbox"/>	<input type="checkbox"/>
n. Mexico.....	<input type="checkbox"/>	<input type="checkbox"/>
o. Middle East.....	<input type="checkbox"/>	<input type="checkbox"/>
p. South America.....	<input type="checkbox"/>	<input type="checkbox"/>
q. United States.....	<input type="checkbox"/>	<input type="checkbox"/>

**12. Please check all other actuarial-related organizations to which you currently belong:** (CHECK ALL THAT APPLY)

- a. American Academy of Actuaries
- b. American Society of Pension Professionals and Actuaries
- c. Conference of Consulting Actuaries
- d. Canadian Institute of Actuaries
- e. Faculty of Actuaries/Institute of Actuaries
- f. Institute of Actuaries of Australia
- g. International Actuarial Association – ASTIN
- h. International Actuarial Association – AFIR
- i. International Association of Consulting Actuaries
- j. Society of Actuaries
- k. Other organization (SPECIFY) \_\_\_\_\_

**13. What is the highest level of academic education you have completed?**

- 1. BA/BS
- 2. MA/MS
- 3. MBA
- 4. JD
- 5. PhD
- 6. Other (SPECIFY) \_\_\_\_\_

**14. Did you earn any college/university degrees in actuarial science?**

- 1. BA/BS
- 2. MA/MS
- 3. No

**15. Other professional designations:** (CHECK ALL THAT APPLY)

- a. Associate in Reinsurance (ARe)
- b. Associate in Risk Management (ARM)
- c. Associate in Investment Management and Research (AIMR)
- d. Chartered Financial Analyst (CFA)
- e. Certified Public Accountant (CPA)/Chartered Accountant (CA)
- f. Chartered Property Casualty Underwriter (CPCU)
- g. Chartered Enterprise Risk Analyst (CERA)
- h. Other (SPECIFY) \_\_\_\_\_

16. Please indicate (A) what percentage of your time over the past two years you have spent in each of the following areas (total should be 100%), and (B) indicate which of the following roles you've played in your career by checking the box to the right:

	(A) % Time Spent Past Two Years	(B) Have Done in My Career
a. Data Management/Systems Administrator .....	_____ %	<input type="checkbox"/>
b. Enterprise Risk Management.....	_____ %	<input type="checkbox"/>
c. Executive Management.....	_____ %	<input type="checkbox"/>
d. Expert Witness .....	_____ %	<input type="checkbox"/>
e. Investments .....	_____ %	<input type="checkbox"/>
f. Management of Actuarial Unit.....	_____ %	<input type="checkbox"/>
g. Planning – Strategic and Financial .....	_____ %	<input type="checkbox"/>
h. Predictive Modeling.....	_____ %	<input type="checkbox"/>
i. Pricing .....	_____ %	<input type="checkbox"/>
j. Product Development.....	_____ %	<input type="checkbox"/>
k. Programming/Software Development .....	_____ %	<input type="checkbox"/>
l. Regulation .....	_____ %	<input type="checkbox"/>
m. Reserving .....	_____ %	<input type="checkbox"/>
n. Risk & Capital Management (e.g., DFA).....	_____ %	<input type="checkbox"/>
o. Teaching/Research .....	_____ %	<input type="checkbox"/>
p. Underwriting/Marketing .....	_____ %	<input type="checkbox"/>
q. Valuation .....	_____ %	<input type="checkbox"/>
r. Other (SPECIFY) .....	_____ %	<input type="checkbox"/>
<b>TOTAL</b> .....	<b>100%</b>	

17. Leadership positions you have held in the last three years: (CHECK ALL THAT APPLY)

- a. CAS Board or Executive Council
- b. Chair of a CAS Committee
- c. Member of a CAS Committee
- d. Another actuarial organization's Board, Executive Council, or Committee
- e. None of the above

18. Do you currently serve as a Member Advisory Panelist for CAS?  1. Yes  2. No

## MEMBER SATISFACTION

19. Do you consider the return on CAS dues investment to be:

- 1. Greater than expected
- 2. Equal to expectation
- 3. Less than expected

20. If you feel that the dues and services/benefits are not in line with each other, what would need to be done to bring them in line? Please explain/specify:

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21. How satisfied are you with the following aspects of CAS:

	Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Not Satisfied At All	No Opinion
a. Overall Satisfaction with CAS .....	1	2	3	4	5	<input type="checkbox"/>
b. CAS Leadership (Board and Officers) .....	1	2	3	4	5	<input type="checkbox"/>
c. Committee Chairs .....	1	2	3	4	5	<input type="checkbox"/>
d. Professional Staff.....	1	2	3	4	5	<input type="checkbox"/>
e. Communications/Publications.....	1	2	3	4	5	<input type="checkbox"/>
f. Meetings/Professional Education .....	1	2	3	4	5	<input type="checkbox"/>
g. Admissions/Credentialing.....	1	2	3	4	5	<input type="checkbox"/>

22. What is the **strongest** attribute of CAS? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

23. What is the **weakest** attribute of CAS? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**YOUR RETIREMENT**

24. If you have retired, in what year did you retire? \_\_\_\_\_

25. If you have not retired, when do you plan to retire?

- a. \_\_\_\_\_  b. Have not made plans

26. (A) have you participated in the following CAS activities since retiring or (B) do you plan to participate in the following CAS activities upon retirement: (CHECK ALL THAT APPLY)

	HAVE PARTICIPATED	PLAN TO PARTICIPATE	DON'T KNOW
a. Volunteer for Committees/Task Forces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Attend CAS Meetings or Seminars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Other (SPECIFY) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

27. If you are retired, are you pleased with the opportunities that the CAS provides to retirees?

1. Yes  2. No

28. What can the CAS do to improve the opportunities provided to retirees? Please explain/specify:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**VOLUNTEERISM**

29. How many hours have you volunteered annually to the actuarial profession on average during the past 5 years? (CHECK ONLY ONE)

1. 0  
 2. 1 – 20  
 3. 21 – 40  
 4. More than 40

30. Is there anything that is limiting you from increasing your participation on CAS committees/task forces: (CHECK ALL THAT APPLY)

- a. No limitation  
 b. Cost  
 c. Time  
 d. Lack of interest at this time  
 e. Not supported by my employer  
 f. Other (SPECIFY) \_\_\_\_\_

31. Would you volunteer more if your travel costs were subsidized or more broadly subsidized by CAS?

1. Yes  2. No



## PUBLICATIONS

32. Please indicate the frequency that you read or reference and the quality of the following actuarial materials:

	FREQUENCY					Have-Not Used	QUALITY					Not Familiar With
	Frequently	Sometimes	Never				High Quality	Average Quality	Low Quality			
a. <i>The Actuarial Review</i> .....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
b. <i>ASTIN Bulletin</i> .....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
c. <i>CAS E-Forum</i> .....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
d. <i>CAS Discussion Paper Program</i> .....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
e. <i>CAS Web Site</i> .....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
f. <i>Insurance: Mathematics and Economics</i> ...	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
g. <i>Journal of Actuarial Practice</i> .....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
h. Materials from CAS-sponsored meetings/seminars.....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
i. <i>North American Actuarial Journal</i> .....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
j. <i>Variance</i> .....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
k. <i>The Actuary</i> .....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>
l. Other (SPECIFY).....	1	2	3	4	5	<input type="checkbox"/>	1	2	3	4	5	<input type="checkbox"/>

33. How satisfied are you with the following aspects of CAS publications?

	Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Not Satisfied At All	No Opinion
a. Improvement over the past five years.....	1	2	3	4	5	<input type="checkbox"/>
b. Content.....	1	2	3	4	5	<input type="checkbox"/>
c. Organization.....	1	2	3	4	5	<input type="checkbox"/>
d. Frequency.....	1	2	3	4	5	<input type="checkbox"/>
e. Format.....	1	2	3	4	5	<input type="checkbox"/>
f. Availability.....	1	2	3	4	5	<input type="checkbox"/>
g. CAS Web Site Search Tools.....	1	2	3	4	5	<input type="checkbox"/>

34. Please provide additional comments on CAS publications:

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## PROFESSIONALISM

35. Should all members be required to periodically attend a Course on Ethics/Professionalism?

1. Yes, for all members     2. Yes, only for members actively participating as actuaries     3. No

36. Should CAS develop and maintain a Members Ethics Handbook?     1. Yes     2. No

## INTERNATIONAL

37. Do you have recognition from an actuarial society other than the CAS, CIA, AAA, or IAA?

1. Yes (SPECIFY) \_\_\_\_\_  
 2. No

38. Are there other actuarial societies from which you are trying to obtain recognition?

1. Yes (SPECIFY) \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
 2. No

**39. Which actuarial organizations do you see as alternatives to the CAS for Non-Life actuarial training? For each organization please indicate whether the training is superior, about equal to the CAS, or inferior.**

ALTERNATIVE ORGANIZATION	SUPERIOR TRAINING TO CAS	ABOUT THE SAME AS CAS	INFERIOR TRAINING TO CAS
a. _____	..... 1	2	3
b. _____	..... 1	2	3
c. _____	..... 1	2	3
d. _____	..... 1	2	3

**40. What are the advantages you see of the CAS training over available global alternatives? Explain:**

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**41. What are the limitations you see of the CAS training over available global alternatives? Explain:**

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**42. Please indicate any local non-CAS actuarial organization in your region that you would recommend that the CAS establish a relationship with:**

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**43. Recognizing that financial and human resources are required, in which areas should the CAS be actively working to support the development of the actuarial profession in countries where the profession is in the developmental stages? Please rate each of the following in terms of its importance to you:**

	Very Important	Important	Neutral	Not Important	Not Important At All	No Opinion
a. Assist emerging markets in developing non-life actuarial disciplines and education..... 1	1	2	3	4	5	<input type="checkbox"/>
b. Subsidize CAS member costs to travel and speak at general insurance/actuarial seminars in developing countries ..... 1	1	2	3	4	5	<input type="checkbox"/>
c. Send CAS leaders to participate in key meetings in these countries..... 1	1	2	3	4	5	<input type="checkbox"/>
d. Make more CAS exam sites available around the world..... 1	1	2	3	4	5	<input type="checkbox"/>
e. Develop a plan to encourage local practitioners in developing countries to become members of the CAS ..... 1	1	2	3	4	5	<input type="checkbox"/>
f. Subsidize the registration/travel costs for actuaries from developing countries <u>to attend</u> CAS meetings and seminars ..... 1	1	2	3	4	5	<input type="checkbox"/>
g. Subsidize the registration/travel costs for actuaries from developing countries <u>to speak</u> at CAS meetings and seminars ..... 1	1	2	3	4	5	<input type="checkbox"/>
h. Work to gain official recognition of the CAS credential in various jurisdictions ..... 1	1	2	3	4	5	<input type="checkbox"/>

**44. The CAS's relationship with the International Actuarial Association should be:** (CHECK ONLY ONE)

- 1. Close alignment
- 2. Active participation
- 3. Act independently

## ENTERPRISE RISK MANAGEMENT (ERM)

45. Please indicate your level of agreement with the following statements:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
a. I have a high-level of knowledge of ERM. ....	1	2	3	4	5
b. The CAS should do more to prepare its members to practice in ERM.....	1	2	3	4	5
c. The CAS should offer an ERM designation .....	1	2	3	4	5
d. Actuaries are ideal candidates for performing ERM functions.....	1	2	3	4	5
e. ERM will create significant new career opportunities for actuaries .....	1	2	3	4	5

46. Are you directly involved in ERM activities in your company?  1. Yes  2. No

47. Please indicate your company's level of involvement in ERM in response to the following questions:

	Very Involved	Involved	Neutral	Uninvolved	Not At All Involved
a. If you work for an insurance or reinsurance company, how entrenched is ERM in your company's operations? .....	1	2	3	4	5
b. If you work for a consulting or brokerage firm, how big a role do ERM services play in your firm's overall client services?.....	1	2	3	4	5
c. If your organization has an ERM function, how involved are its casualty actuaries? .....	1	2	3	4	5

48. Should the CAS alter its current emphasis on ERM? (CHECK ONLY ONE)

- 1. Greatly increase
- 2. Increase somewhat
- 3. Do not alter
- 4. Reduce somewhat
- 5. Greatly reduce

49. What percent of their time, in aggregate, do the actuaries at your company spend on ERM? (CHECK ONLY ONE)

- 1. 0% – 10%
- 2. 11% – 30%
- 3. 31% – 50%
- 4. More than 50%
- 5. I don't know

50. Does your company have a Chief Risk Officer?  1. Yes  2. No  3. Don't know

51. Is the Chief Risk Officer at your company an Actuary?  1. Yes  2. No  3. Don't know

52. What is the background of the Chief Risk Officer? (CHECK ALL THAT APPLY)

- a. Fellow of the CAS
- b. Associate of the CAS
- c. Fellow of the SOA
- d. Other actuarial
- e. MBA
- f. JD
- g. Associate in Risk Management (ARM)
- h. Chartered Financial Analyst (CFA)
- i. Certified Public Accountant (CPA)/Chartered Accountant (CA)
- j. Chartered Property Casualty Underwriter (CPCU)
- k. Chartered Enterprise Risk Analyst (CERA)
- l. Don't know
- m. Other (SPECIFY) \_\_\_\_\_

**53. What professions are the CAS's chief competition in the field of ERM? (CHECK ALL THAT APPLY)**

- a. Risk Management
- b. Finance
- c. Engineering
- d. Statisticians
- e. Other (SPECIFY) \_\_\_\_\_

**ADMINISTRATION**

**54. Who pays for your CAS-related costs (excluding amounts reimbursed by the CAS)?**

	I PAY ALL	I PAY SOME	MY EMPLOYER PAYS ALL
a. CAS Dues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. CAS Meeting/Seminar Registration Fees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Travel Expenses to Meetings/Seminars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. CAS Volunteer Activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**55. If you were asked to pay for all of the following yourself, would you?**

	YES	YES, BUT LESS OFTEN	No
a. CAS Dues	<input type="checkbox"/>	—	<input type="checkbox"/>
b. CAS Meeting/Seminar Registration Fees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Travel Expenses to Meetings/Seminars	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. CAS Volunteer Activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**56. How often do you access the CAS Web Site? (CHECK ONLY ONE)**

- 1. More than once per week
- 2. Once per week
- 3. Once per month
- 4. Less than once per month
- 5. Never accessed it

**57. What changes would you like to see on the CAS Web Site (e.g., content, navigation, features)?**

\_\_\_\_\_

\_\_\_\_\_

**CAS STRATEGIC DIRECTION**

**58. How significant should the CAS's efforts and strategies be in the following:**

	Very High	High	Neutral	Low	Very Low
a. International Presence and Outreach.....	1	2	3	4	5
b. Enterprise Risk Management.....	1	2	3	4	5
c. Predictive Modeling .....	1	2	3	4	5
d. Stochastic Reserving .....	1	2	3	4	5
e. International Financial Reporting Standards .....	1	2	3	4	5

**59. How would you rate the following threats to current and future members of the CAS?**

	Very High	High	Neutral	Low	Very Low
a. Off-shoring of actuarial jobs from the United States .....	1	2	3	4	5
b. Merging with other actuarial organizations.....	1	2	3	4	5
c. Credibility of the actuarial profession.....	1	2	3	4	5
d. Actuarial malpractice .....	1	2	3	4	5
e. Competition from other professions.....	1	2	3	4	5
f. Perception of actuaries as having a narrow technical focus .....	1	2	3	4	5
g. Other threats (SPECIFY) _____	1	2	3	4	5

60. Of the various actuarial organizations in North America and the world, what unique roles or benefits:

a. does the CAS provide? \_\_\_\_\_  
\_\_\_\_\_

b. should the CAS provide? \_\_\_\_\_  
\_\_\_\_\_

61. What are the top two issues that will impact your professional life in the next five years?

1. \_\_\_\_\_  
2. \_\_\_\_\_

62. What are the top two issues that will impact the CAS in the next five years?

1. \_\_\_\_\_  
2. \_\_\_\_\_

OPTIONAL: To be entered into the drawing for the \$100 cash prize, please include your contact information:

NAME: \_\_\_\_\_

COMPANY: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

E-MAIL: \_\_\_\_\_

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**THANK YOU VERY MUCH FOR COMPLETING THIS SURVEY.**

**IF YOU ARE NOT COMPLETING THE SURVEY ONLINE, PLEASE FAX YOUR QUESTIONNAIRE DIRECTLY TO:**



**FAX: 240-268-1267**

**ASSOCIATION RESEARCH, INC.  
15200 SHADY GROVE ROAD, SUITE 306  
ROCKVILLE, MD 20850**

**DEADLINE: OCTOBER 22, 2008**

<p><b>IF YOU PREFER TO COMPLETE THE SURVEY ONLINE, PLEASE DO SO BY GOING TO THIS WEB SITE: <a href="http://www.ari-surveys.com/run/CASmember08B">www.ari-surveys.com/run/CASmember08B</a></b></p>
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